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Data visualization

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

Benefits of data visualization :

Data visualization can be used in many contexts in nearly every field, like public policy, finance, marketing, retail, education, sports, history and more. Here are the benefits of data visualization:

- Dash Board and Storytelling : People are drawn to colors and patterns in clothing, arts and culture, architecture, and more. Data is no different - colors and patterns allows us to visualize the story within the data.

- Accessibility : Information is shared is an accesible, easy-to-understand manner for a variety of audiences.

- Visualize relationships : It's easier to spot the relationships and patterns within a data set when the information is presented in a graph or chart.

- Exploration : More accessible data means more opportunities to explore, collaborate, and inform actionable decisions.

Tools for visualizing data

There are plenty of data visualization tools out there to suit your needs. Before committing to one, consider researching whether you need an open-source site or cloud simply create a graph using Excel or Google Charts. The following are common data visualization tools that could suit your needs.

- Tableau
- Google Charts
- Dundas BI
- Power BI
- JupyteR
- Infogram
- ChartBlocks
- D3.js

- Fusion Charts
- Grafana

Advantages and Disadvantages of Data Visualization

Advantages of Data visualization :

- Enhanced Comparison : Visualizing performances of two elements or scenarios streamlines analysis, saving time compared to traditional data examination.

- Improved Methodology : Representing data graphically offers a superior understanding of situations, exemplified by tools like Google Trends illustrating industry trends in graphical forms.

- Efficient Data Sharing : Visual data presentation facilitates effective communication, making information more digestible and engaging compared to sharing raw data.

- Sales Analysis : Data Visualization aids sales professionals in comprehending product sales trends, identifying influencing factors through tools like heat maps, and understanding customer types.

geography impacts, and repeat customer behaviors.

• Identifying Event Relations: Discovering correlations between events helps business understand external factors affecting their performance, such as online sales surges during festive seasons.

• Exploring Opportunities and Trends: Data visualizeti-on empowers business leaders to uncover patterns and opportunities within vast datasets, enabling a deeper understanding of customer behaviors and insights into emerging business trends.

Disadvantages of Data Visualization:

• Can be time-consuming: Creating visualizations can be a time-consuming process, especially when dealing with large and complex datasets.

• Can be misleading: While data visualization can help identify patterns and relationships in data, it can also be misleading if not done correctly. Visualizations can create the impression of patterns or trends that may not exist, leading to incorrect conclusions and poor decision-making.

- Can be difficult to interpret: Some types of visualizations, such as those that involve 3D or interactive elements, can be difficult to interpret and understand.
- May not be suitable for all types of data: Certain types of data, such as text or audio data, may not lend themselves well to visualization. In these cases, alternative methods of analysis may be more appropriate.

Tableau

Tableau is an excellent data visualization and business intelligence tool used for reporting and analyzing vast volumes of data. It helps users create different charts, graphs, maps, dashboards, and stories for visualizing and analyzing data, to help in making business decisions.

Tableau Products and its Applications

Tableau offers different-different types of products based on the tasks to perform.

- Tableau Desktop
- Tableau Online

- Tableau Server
- Tableau Public
- Tableau Prep.

Tableau Desktop

Tableau Desktop is a data visualization software that allows you to connect, visualize, and share data in an easy-to-understand format. It is the only authorized tool the Drag-and-drop authorized provides drag-and-drop features and allows all the functionalities. You may quickly find hidden insights and make important business decisions using a simple drag-and-drop interface. Basically, it is a premium version.

Tableau Server

Tableau Server is a web product of Tableau that allows users to do collaborative work on the same database at two different places. People can access it, either through mobile or the desktop.

Tableau Online

Tableau Online is a cloud-based platform that performs the same functionality as Tableau Server.

Hence it removes all the overhead work of maintaining the server and establishing it. Moreover, it provides the same work of uploading the dataset on the server from anywhere via an internet connection.

Tableau Public :

Tableau Public is a free product of Tableau which provides some limited functionalities for those who want to learn data visualization and understand business Intelligence. It majorly targets students who want to deep dive into the field of business analytics. But it has one demerit that the work which you will do will not be only till you. It will be shared over the network as it does not support security.

Tableau Prep :

Tableau Prep is a data preparation and ETL (Extract, Transform, Load) tool created by Tableau. It is intended to assist users with cleaning, shaping, and combining data from diverse sources, so that it is ready for analysis and visualization in Tableau Desktop or Tableau Server. As data cleaning is the first and foremost step which is of high importance otherwise datasets may contain

NULL values and may result in wrong prediction of data.

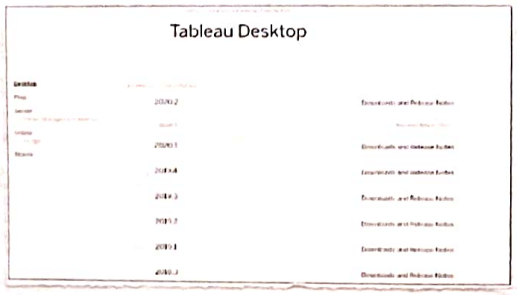
Tableau Features

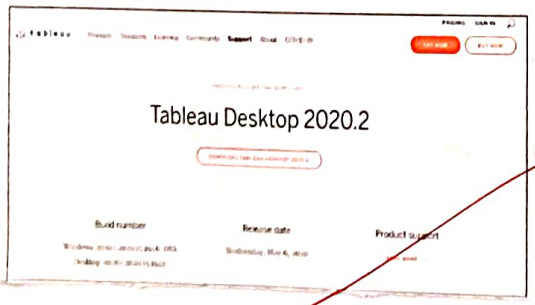
- Tableau supports powerful data discovery and exploration that enables users to answer important questions in seconds
- No prior programming knowledge is needed; users without relevant experience can start immediately with creating visualizations using Tableau.
- It can connect to several data sources that other BI tools do not support. Tableau enables users to create reports by joining and blending datasets.
- Tableau Server supports a centralized to manage all published data sources within an Organization.

Tableau Used

Tableau is primarily used for:

- Data Visualization: Transform raw data into visually appealing and easy-to-understand charts, graphs and maps.





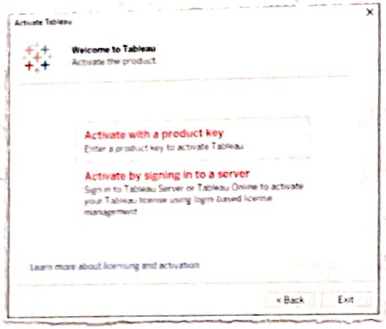
- Business Intelligence : Empower decision-makers with insights derived from data
- Data analysis : Explore and analyze large datasets to uncover trends, patterns, and anomalies (all without requiring SQL)
- Dashboard creation : Design interactive, real-time dashboards that provide an at-a-glance view of key performance indicators (KPIs)
- Operational reporting : Generate visually appealing reports that communicate data-driven insights effectively.

Installing Tableau Desktop

Knowing what is tableau is the first step, however how to install it follows right after. The following are the steps for downloading Tableau Desktop:

- Click on the Tableau Public Desktop - Products Download and Release Notes page and select the version you want to download

- Select the DOWNLOAD TABLEAU DESKTOP version option and select your operating system.

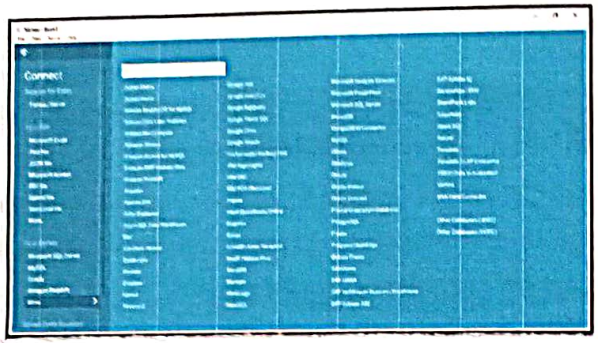


- Once you have downloaded the file, go ahead and install it.
- Launch Tableau Desktop, and it will show you the Tableau registration form, which is where you can register and activate your product.

- Enter ~~the~~ your product key or sign in to Tableau Server or Tableau Online to activate your Tableau license. Upon successful activation, you can start

How to Connecting a Data Sources in Tableau:

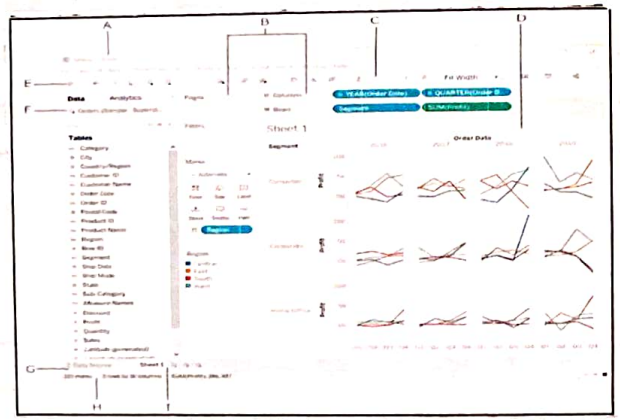
Tableau is capable of connecting with a wide range of data sources. It can connect to files present in your system, such as Microsoft Excel, text files, JSON, PDF etc. It can also work on data present on a database server, such as Microsoft SQL Server, MySQL, Oracle, Teradata, etc. There are other saved data sources that Tableau can connect with. It also can connect and fetch data from cloud sources, like AWS, Azure SQL Data Warehouse, and Google Cloud SQL.



The following is an example of importing an excel file to Tableau Desktop.

Under Connect, click on Microsoft Excel. Locate the Excel file present in your system, which will export the dataset into Tableau. As you can see below, we have imported the Sample - Superstore dataset. Now drag the required sheets under the "Drag sheets here" space.

Now, if you click on Sheet 1, you can see all the fields of the dataset under Dimensions and Measures.



Experiment No1 :

Getting Started - Tableau Workspace, Tableau terminologies, basic functionalities.

The Tableau workspace consists of menus, a toolbar, the Data pane, cards and shelves, and one or more sheets. Sheets can be worksheets, dashboards, or stories. For details on dashboard or story workspaces, see create a Dashboard or The Story Workspace.

A. Workbook name - A workbook contains sheets. A sheet can be a worksheet, a dashboard, or a story. For more information, see Workbooks and Sheets.

B. Cards and Shelves - Drag fields to the cards and shelves in the workspace to add data to your view.

C. Toolbar - Use the toolbar to access commands and analytics and navigation tools.

D. View - This is the canvas in the workspace where you create a visualization (also referred to as a "viz").

E. Click this icon to go to the Start page, where you can connect to data. For more information, see Start Page.

F. Side Bar - In a worksheet, the side bar area contains the Data pane and the Analytics pane.

G. Click this tab to go to the Data Source page and view your data. For more information, see Data Source Page.

H. Status bar - Displays information about the current view.

I. Sheet tabs - Tabs present each sheet in your workbook. This can include worksheets, dashboards and stories. For more information, see Workbooks and Sheets

Tableau Terminology

Cross-tab	Another name for a text table or a table of numbers.
Dashboard	A collection of views shown in a single location where you can compare and monitor a variety of data simultaneously.
Data source.	The underlying data that Tableau Reader is connected to. You can't change the data source in Tableau Reader.
Filter	A control on a view that limits the data shown in a view. For example, a filter on Region that only includes the West.
Marks	A visual representation of one or more rows in a data source. Mark types can be bar, line, square, and so on.
Packaged workbook	A type of workbook created in either Tableau Desktop or Tableau Server. These files contain both the workbook as well as copies of the referenced local file data sources and background images.
Pane	The row and columns areas in a view.
Repository	A folder located in your My Documents folder that stores workbooks.
View	The visual representation of your data in a worksheet or dashboard.

Workbook	A collection of one or more worksheets and dashboards.
Worksheet	A single view of data. Each worksheet can be connected to a single data source.

Basic functionalities :

Data Connection :

- Connect to Data : Import data from various sources such as spreadsheets, databases, cloud services, and web data connectors.

- Live Connection vs Extract : Choose between connecting directly to your data (live) or creating a snapshot (extract) for offline use and performance optimization.

Data Preparation :

- Data Blending : Combine data from different sources by defining relationships.

- Data Joins : Merge data from different tables or sources based on common fields.

• Data Cleaning: Use built-in tools to clean and preprocess your data, such as handling null values, changing data types, and renaming fields.

Creating Visualizations:

• Drag-and-Drop Interface: Easily build visualizati-ons by dragging fields onto rows and columns, or onto the Marks shelf.

• Common Charts: Create bar charts, line charts, pie charts, scatter plots, and more.

• Maps: Generate geographic visualizations if your data includes location information.

Filters and Sorting:

• Apply Filters: Restrict the data displayed in your visualizations using filters, which can be applied to specific dimensions or measures.

• Sorting: Arrange data in ascending or descending order based on one or more fields.

Creating Dashboards :

• Combine Visualizations : Bring together multiple worksheets into a single dashboard for a comprehensive view.

• Interactive Elements : Add interactive features like filters, dropdowns, and buttons to allow users to interact with the dashboard.

Creating Stories :

• Sequential Views : Build a narrative by combining multiple visualizations and dashboards into a story, guiding users through data insights.

Calculated Fields :

• Custom Calculations : Create new fields using formulas based on existing data, allowing for custom metrics and logic.

Parameters :

• Dynamic Inputs : Use parameters to create dynamic controls that can adjust calculations, filters, and

visualizations based on user input.

Formatting :

• Customize Appearance : Format visualizations and dashboards, including adjusting colors, fonts, and sizes to improve readability and aesthetics.

Sharing and Publishing :

• Save and Export : Save workbooks locally, export visualizations as images or PDFs, and share them via email or other platforms.

• Tableau Server / Tableau Online : Publish workbooks to Tableau Server or Tableau Online for collaborative access and sharing with others.

Tooltips :

• Additional Information : Display extra details about data points when users hover them.

Legends and Annotations :

• Explanatory Notes : Add legends to explain the

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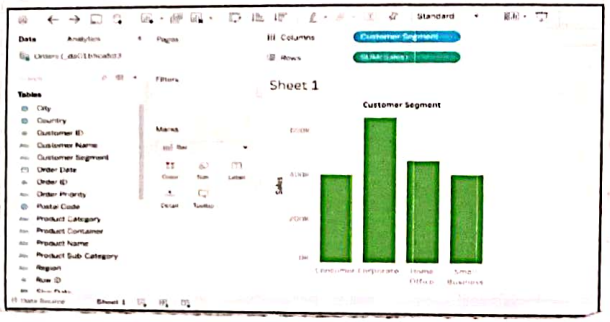
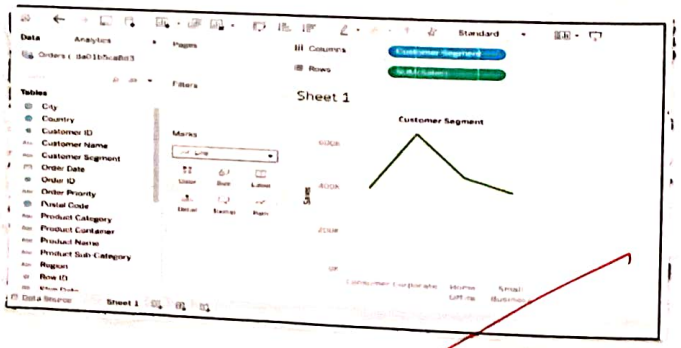
meaning of colors and sizes, and annotations to highlight important data points or trends.





Experiment 7 :

Creating Reports & Visualizations - Different types of charts. Formatting charts with Title, Colors.

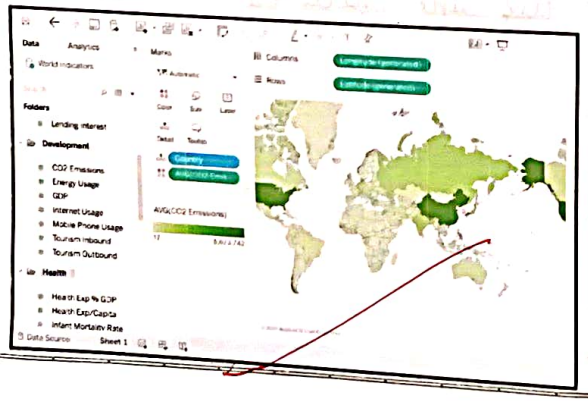
7.1 Types of charts

1. Bar Chart

Bar charts are one of the most common data visualizations. You can use them to quickly compare data across categories, highlight difference, show trends and outliers, and reveal historical highs and lows at a glance. Bar charts are especially effective when you have data that can be split into multiple categories.

2. Line Chart

The line chart, or line graph, connects several distinct data points, presenting them as one continous evolution. Use line charts to view trends in data, usually over time (like stock price changes over five years or website page views for the month). The result is a sample, straight forward way to visualize changes in one value relative to another.



3. Pie Chart

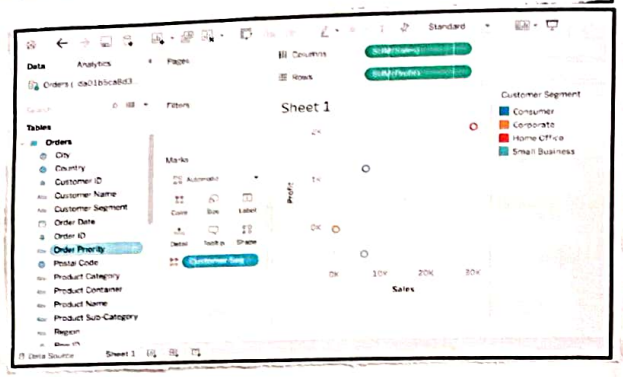
Pie charts are powerful for adding detail to other visualizations. Alone, a pie chart doesn't give the viewer a way to quickly and accurately compare information. Since the viewer has to create context on their own, key points from your data are missed. Instead of making a pie chart the focus of your dashboard, try using them to drill down on other visualizations.

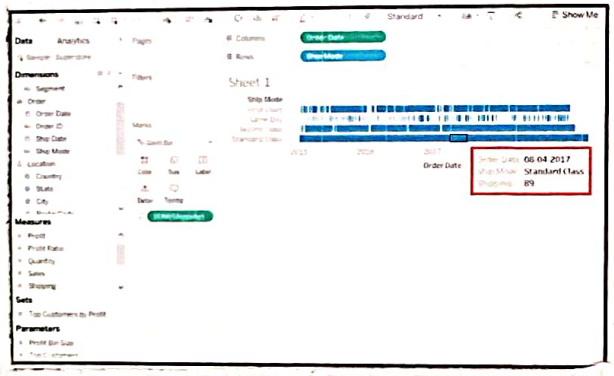
4. Maps

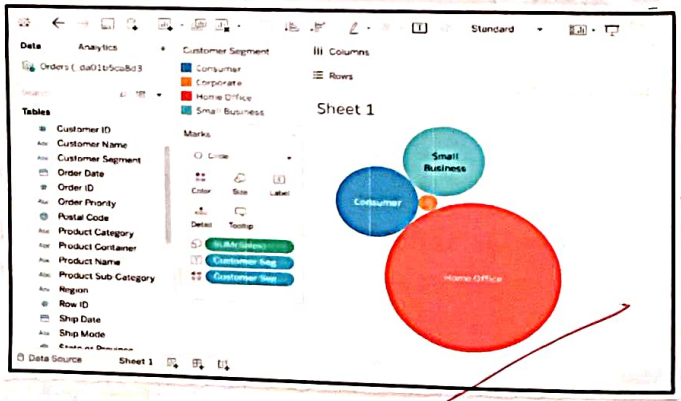
Maps are a no-brainer for visualizing any kind of location information, whether it's postal codes, state abbreviations, country names, or your own custom geocoding. If you have geographic information associated with your data, maps are a simple and compelling way to show how location correlates with trends in your data.

5. Density Maps

Density maps reveal patterns or relative concentrations that might otherwise be hidden due to an overlapping mark on a map - helping you identify locations with greater or fewer numbers of data points. Density maps are most effective when working with a data set of containing many data points in a small geographic area.







6. Scatter Plot.

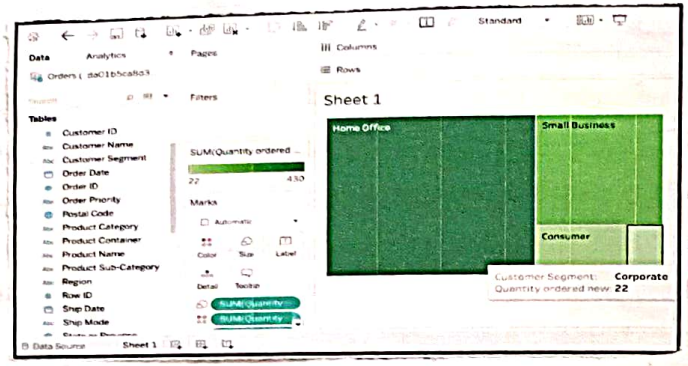
Scatter plots are an effective way to investigate the relationship between different variables, showing if one variable is a good predictor of another, or if they tend to change independently. A scatter plot present lots of distinct data points on a single chart. The chart can then be enhanced with analytics or trend lines

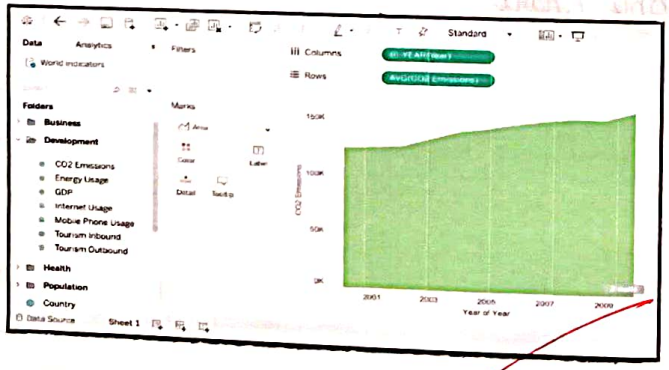
7. Gantt Chart

Gantt charts display a project ~~she~~ schedule or show changes in activity over time. A Gantt chart shows steps that need to be to completed before others can begin, along with resource allocation.

8. Bubble Chart

Although bubbles aren't technically their own type of visualization, using them as a technique adds detail to scatter plots or maps to show the relationship between three or more measures. Varying the size and color of circles creates visually compelling charts that present large volumes of data at once.





9. Tree map :

Tree maps relate different segments of your data to the whole. As the name of the chart suggests, each rectangle in a tree map is subdivided into smaller rectangles, or sub-branches, based on its proportion to the whole. They make efficient use of space to show percent total for each category.

For more types of charts, visual examples, tips and information, download our whitepaper. In this paper, you'll learn about different chart (and graph) types - from bar charts to density maps to box-and-whisker plots. You'll also learn when to use one chart over another, along with tips on how to leverage these chart types for maximum impact.

10. Area Chart

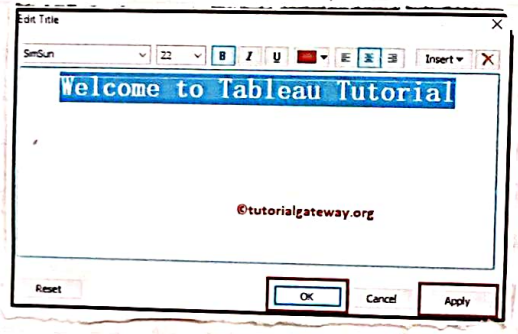
An Area Chart is similar to a Line Chart in that it also visualizes the data in the form of a line that is very useful in understanding trends and patterns. However, the area under the line in an area chart is also colored. This can be used with multiple variables in the data to demonstrate the relative differences between the variables

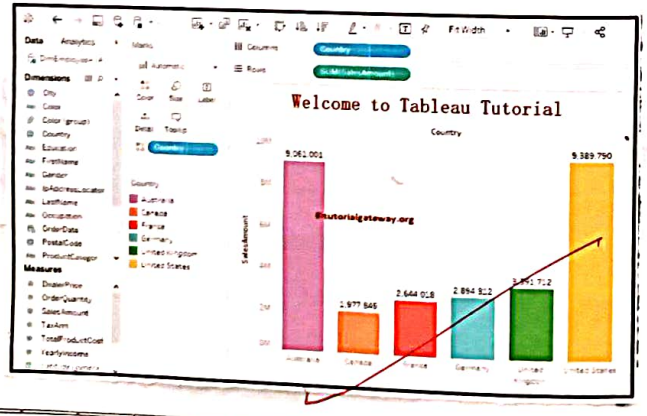
11. Donut Chart

A donut chart is a type of pie chart that features a hole in the centre, similar to a donut. Donut Charts present categories in the form of arcs instead of slices. Although, at first impression, the hole in the centre may only seem to serve as aesthetic appeal, it serves a greater purpose by helping viewers avoid confusion surrounding the area parameter.

12. Histogram chart

A histogram looks like a bar chart but group values for a continous measure into range. In the histogram, each bar represents the height of the number of values present in that range. Now each coloured section of each bar shows its percentage of total quantity shown in the following screenshot.





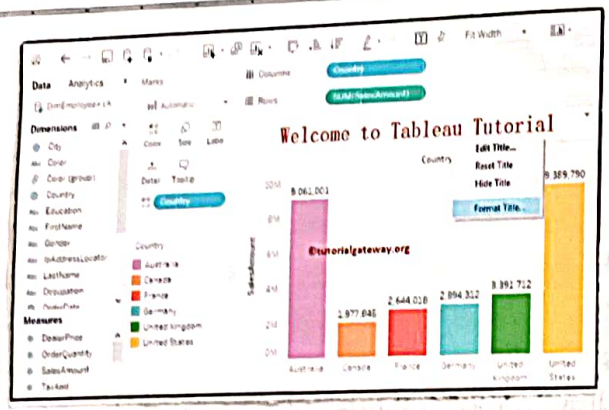
7.2. Format Tableau Chart Title

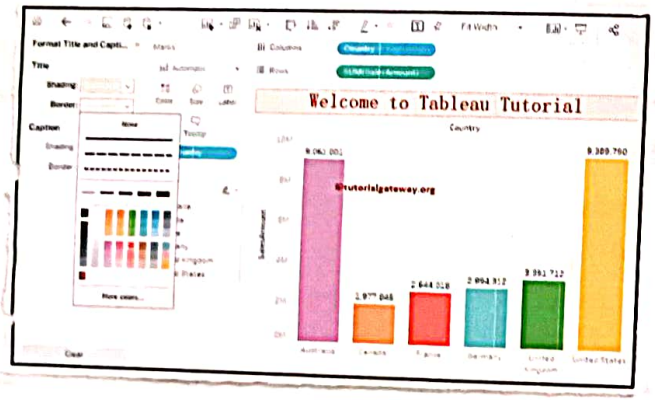
To format the chart title, Right-click on the report title, which will show you the context menu. Please select the Edit Title option to make changes to the Title. For more charts >> Click Here.

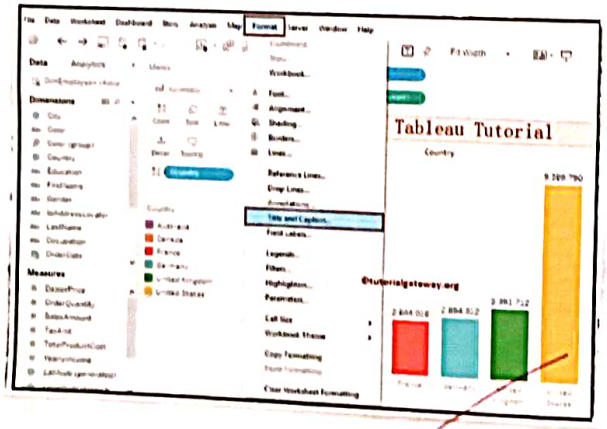
Selecting the Edit Title option will show you the following window. By default, Tableau will display the Sheet name as the chart title.

First, we changed the Chart to Welcome to Tableau Tutorial. Next, we changed the Font style to SimSun, Font size to 22, Font weight to Bold, text alignment to Center. and font color to Red.

Now you can see the formatted Tableau Chart Title, which is a neat and clean title







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Next, right-click on the title, and this time, select the Format Title option.

It will open the Format title and caption window. Use this tab to add the shading and border colors to the title and the caption. For the demonstration purpose, let me add the background color and the border liens to the title.

You can also access these formatting options by clicking the Tableau Format menu and selecting the Title and Caption submenu. It will show the formatted chart title window as shown in the above screenshot.

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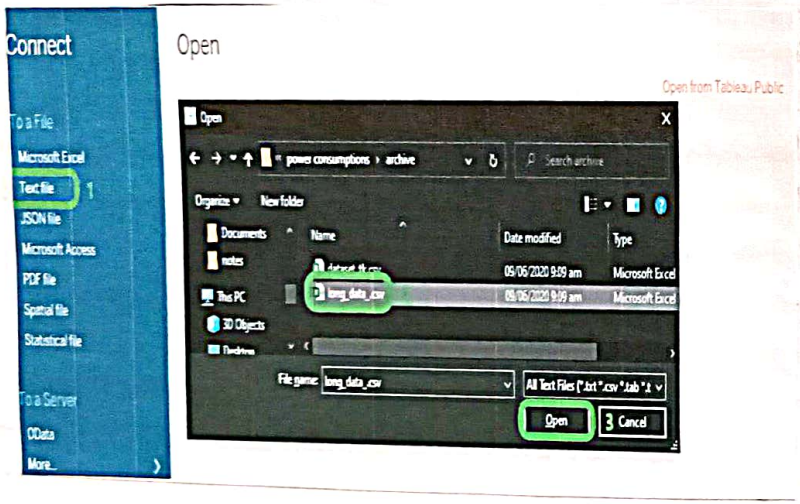
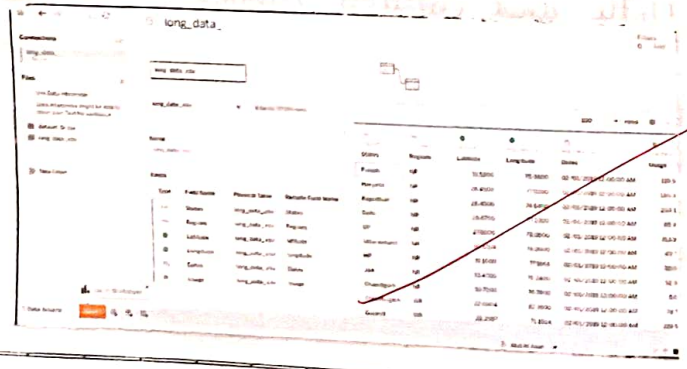
Teacher's Signature : _____

MERIT





Experiment 3 :

Dashboard Design and Storytelling - Components of Dashboard, Understanding how to place worksheets in Containers, Action filters and its types.

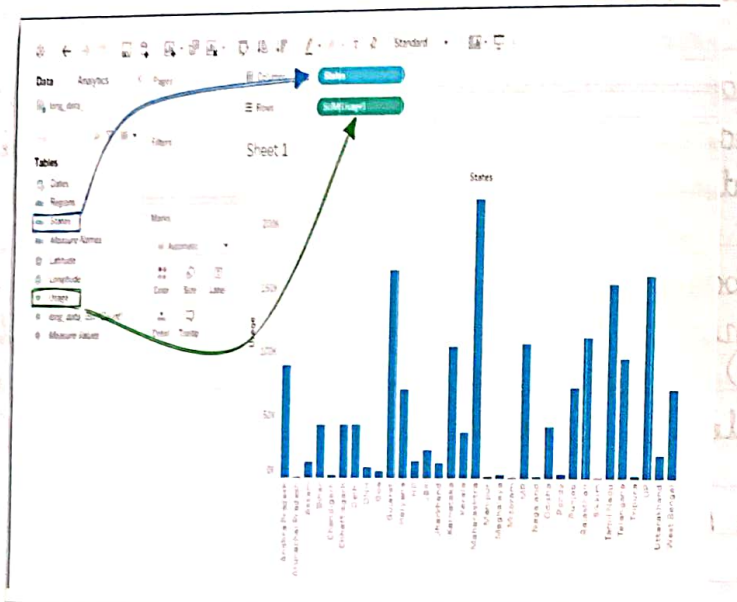
Dashboard is a visual workspace where you can combine multiple views (like charts, maps and tables) from different sheets into a single interface is called dashboard.

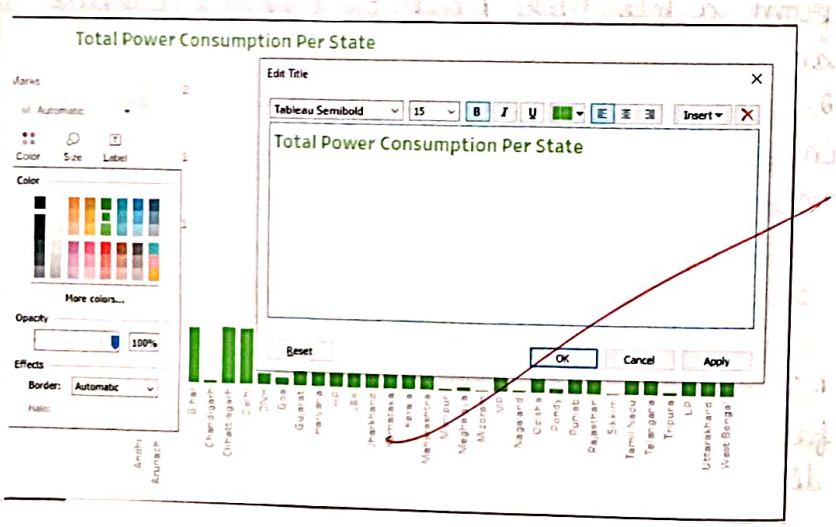
Step 1 : Connect to Your Data

1. Open Tableau and select Connect to import data from a file (like Excel or CSV), a database or another data source.
2. Once connected, Tableau will display your data in the Data pane, where you can view its structure and columns.

Step 2 : Explore and Prepare Data

1. Review the data structure in Tableau to ensure that fields are correctly classified (e.g., measures or dimensions).





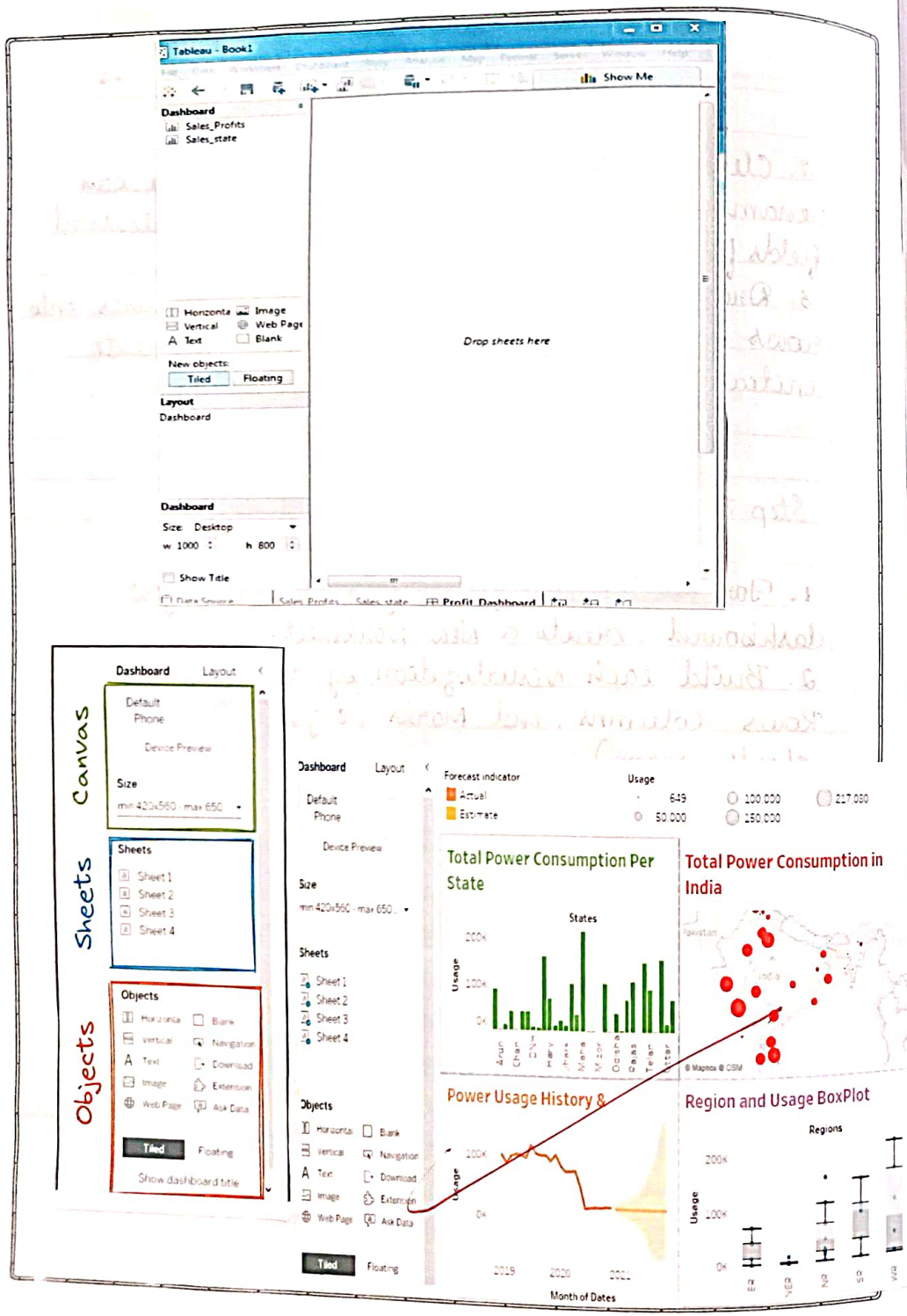
2. Clean or transform the data if needed. You can rename fields, change data types, or use calculated fields for additional analysis.
3. Drag and drop dimensions and measures onto rows and columns in the Worksheet to create initial views.

Step 3 : Create Visualizations (Sheets)

1. For each visualization you want on your dashboard, create a New Worksheet.
2. Build each visualization by dragging fields to Rows, Columns, and Marks (e.g., bar charts, line charts, maps).
3. Customize each visualization with Filters, Colors, Labels, and Tooltips as needed.

Step 4 : Build the Dashboard

1. Click on New Dashboard from the bottom pane. This will open a blank dashboards canvas.
2. Drag your individual sheets from the Dashboard pane on the left side of the screen onto the dashboard canvas.



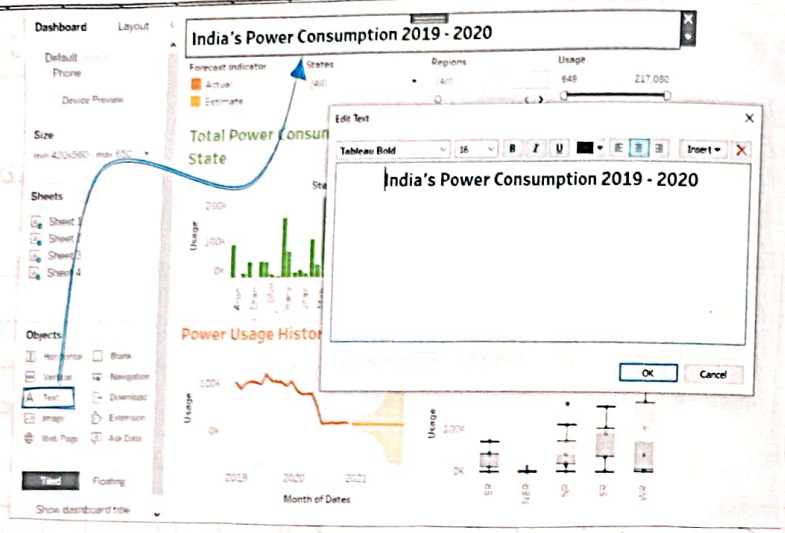
3. Arrange and resize the sheets on the dashboard as desired.

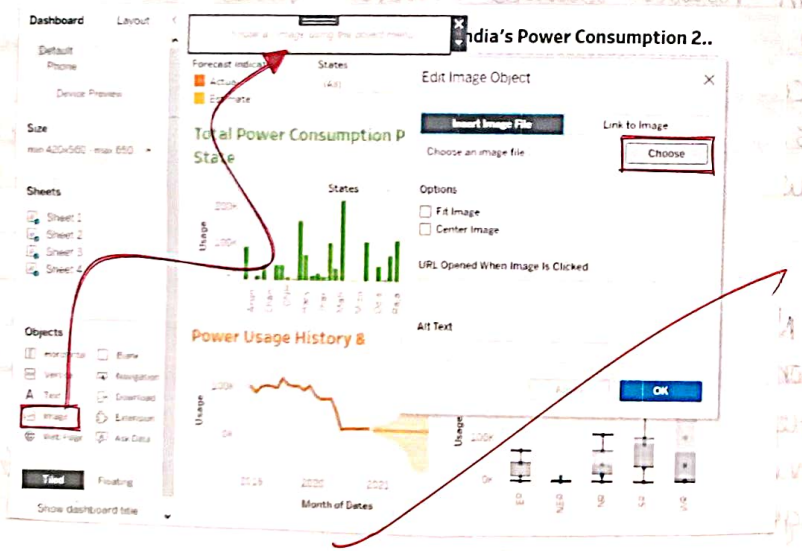
4.1 Components of Dashboard

The Dashboard window has a dashboard panel on the left side that consists of three sections:

1. Canvas : to set the size of the dashboard based on various devices (Mobile, Tablet, etc).
2. Sheets : for adding and removing worksheets on canvas.
3. Objects : for adding text, images, extensions, webpage, and buttons to canvas.

Now, we will double-click on all sheets one by one to add them to the dashboard canvas with related filters. We can adjust the locations of visualizations and filters and adjust the size to give it a clean look.



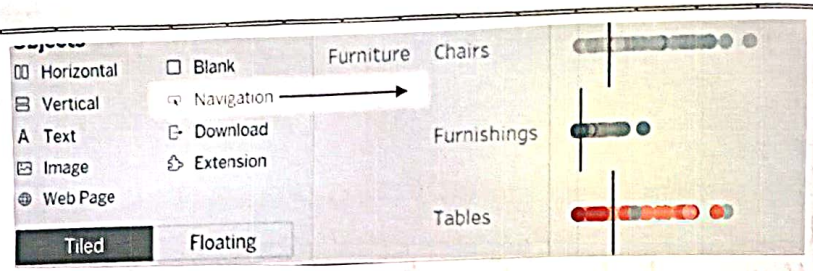


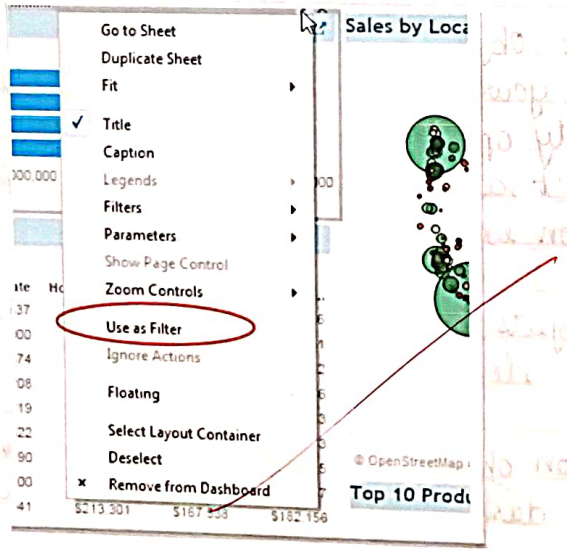
- Horizontal and vertical objects provide layout containers that let you group related objects together and fine-tune how your dashboard resizes when users interact with them.
- Text objects can provide headers, explanations, and other information.
- Image objects add to the visual flavour of a dashboard, and you can link them to specific target URLs. (While Web Page objects can also be used for images, they are better for complete web pages. The Image Object provides image-specific fitting, linking, and alt-text options.)

- Web Page objects display targets pages in the context of your dashboard. Be sure to review these web security options, and be aware that some web pages don't allow themselves to the embedded - Google is on example.

- Blank objects help you adjust spacing between dashboard items.

- Navigation objects let your audience navigate from one dashboard to another, or to other sheets or





stories. You can display text or an image to indicate the button's destination to your users, specify custom border and background colors, and provide informational tooltips.

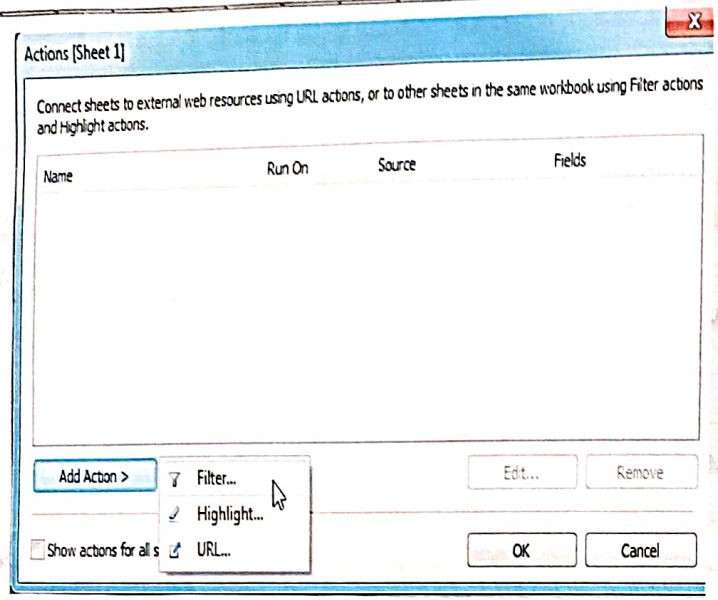
4.2 Action Filters

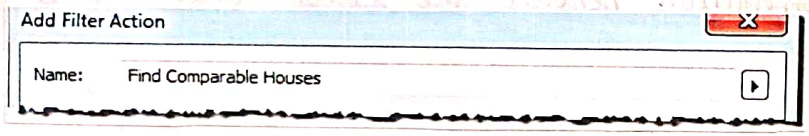
Filter actions send information between worksheets. Typically, a filter action sends information from a selected mark to another sheet showing related information. Behind the scenes, filter actions send data values from the relevant source fields as filters to the target sheet.

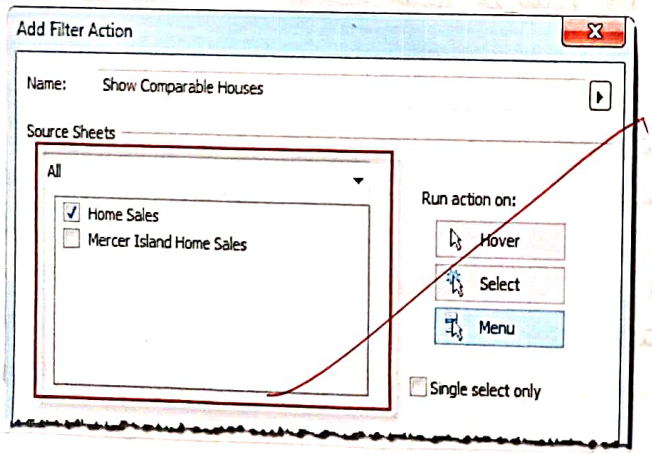
Credit or edit a filter action

1. Do either of the following:
   - On a worksheet, select Worksheet > Actions.
   - On a dashboard, select Dashboard > Actions.

From the drop-down menu of a dashboard sheet, you can also select Use as Filter. In the actions dialog box, "generated" appears in the default names of actions created this way.







2. In the Actions dialog box, click Add Action, and then select Filter. Or select an existing action, and choose Edit.

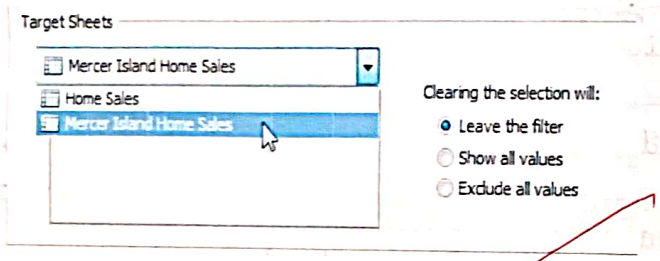
3. Specify a name for the action.

Tip: If you plan to launch an action from a tooltip menu, use a descriptive name so users will understand the action's purpose. From the menu to the right of the Name box, you can insert variables that are drawn from the values of selected fields (Link opens in a new window).

4. Select a source sheet or data source. If you select a data source or dashboard, you can select related sheets you want to launch the action from.

5. Specify how the action runs:
- Hover - Runs when you mouse over marks in the view.
- Select - Runs when you click marks in the view.

If you want to avoid running the action when



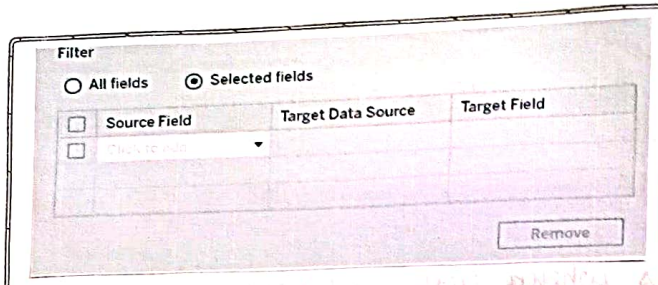
multiple marks are selected, also select Single-select only.

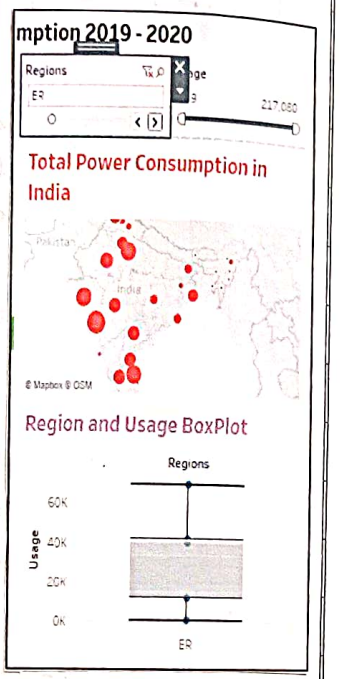
- Menu - Runs when you right-click (Windows) or Control-Click (macOS) a mark in the view, and then click an option in the tooltip menu.

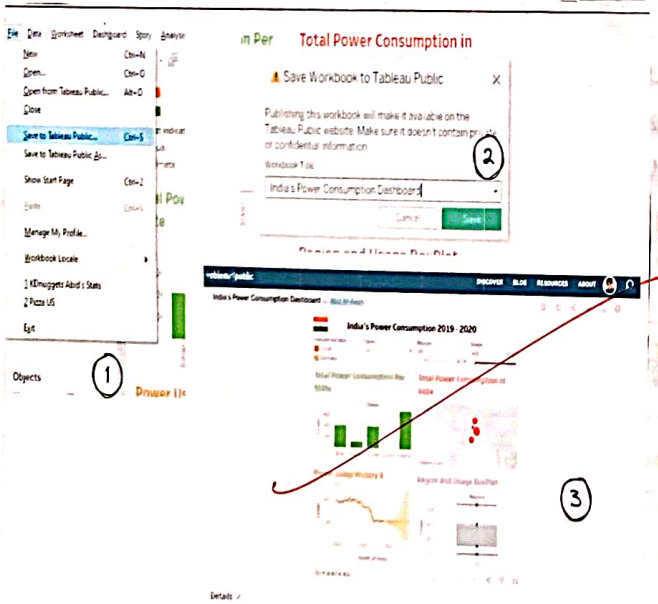
6. Select a target sheet. When you select a dashboard, you can select one or more sheets within it.

7. Specify what happens when the selection is cleared in the view:
- Leave the filter - Continues to show filtered results on the target sheets. (In web-authoring mode, this is labeled Keep filtered values).
- Show all values - Changes the filter to include all values.
- Exclude all values - Changes the filter to exclude all values. This option is useful when you're building dashboards that only show some sheets if a value is another sheet is selected.

8. Specify the data that you want to show on the target sheets. You can filter on All Fields or Selected Fields.





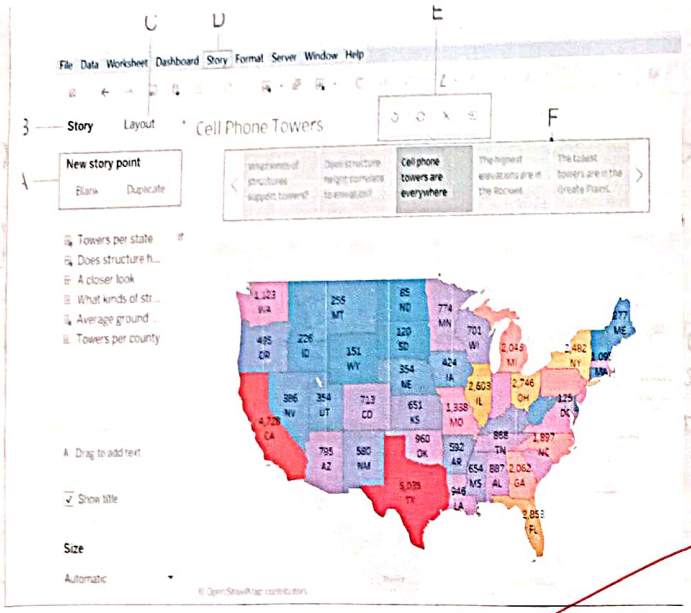


9. If you chose Selected Fields, click a drop-down menu in the Source Field column, and select a field. Then select a target data source and field.

The filters that we have just added are unconnected and only affect a single visualization. For example, if you change Regions from "(All)" to "ER", the filter will only be applied to the Boxplot, as shown below.

Publishing

To publish the dashboard and share it with a broader audience, we can simply click on File > Save to Tableau Public and then write a workbook title to save it. Uploading the changes to the public server takes a few seconds. We will then be redirected to an online version of the dashboard. Make sure you are logged into your public account.



4.3 Story Telling

Stories are universal tools of engagement. They move through us, guiding us on a journey marked by peril, victory, loss and love. While stories are as old as time, Tableau offers a modern and powerful medium to share stories. A story is a sheet, so the methods you use to create, name, and manage worksheets and dashboards also apply to stories. At the same time, a story is also a collection of sheets, arranged in a sequence. Each individual sheet in a story is called a story point.

As you work on a story, you can use the following controls, elements and features.

A. Option for adding a new story point : Choose Blank to add a new point or Duplicate to use the current story point as the starting place for your next point.

B. The Story pane : Use this pane to drag dashboards sheets, and text descriptions to your story sheet. This is also where you set the size of your story and display or hide the title.

C. The Layout pane: This is where you choose your navigator style and display or hide the forward and back arrows.

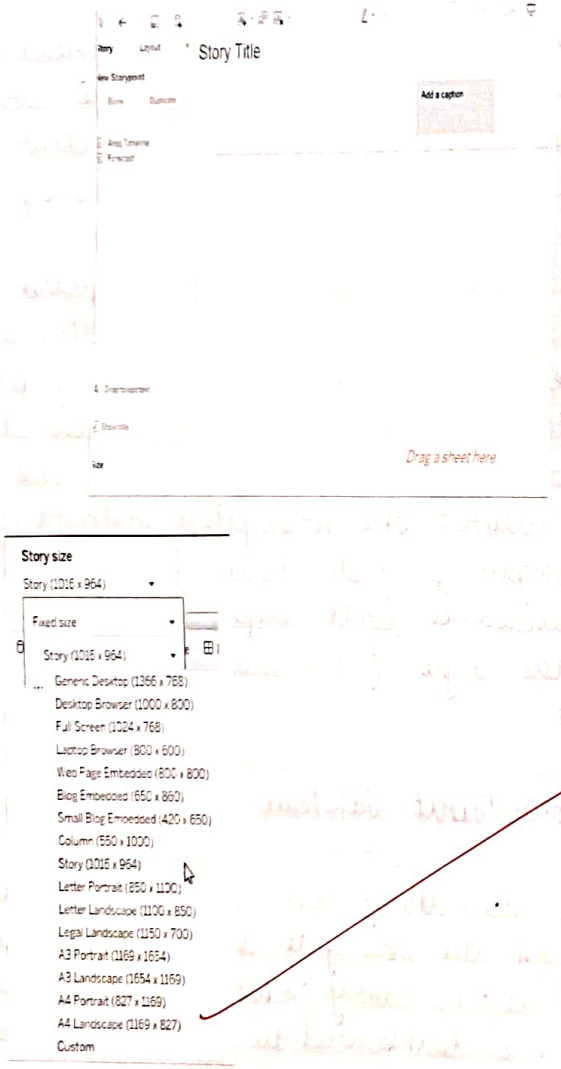
D. The Story menu: Use this menu in Tableau Desktop to format the story or copy or export the current story point as an image. You can also clear the entire story here or show or hide the navigator and story title.

E. The Story toolbar: This toolbar appears when you mouse-over the navigator area. Use it to revert changes, apply updates to a story point, delete a story point, or create a new story point out of the current, customized one.

F. The navigator: The navigator allows you to edit and organize your story points. It's also how your audience will step through your story. To change the style of the navigator, use the Layout pane.

Building Your First Tableau Story

To open a new story tab, click on the New Story icon. You can also navigate to the menu bar at the top and select Story > New Story. To add worksheets or a dashboard to your first story



point, navigate to the left pane and drag the sheet onto the blank canvas.

Create a story point

1. Click the New Story tab.

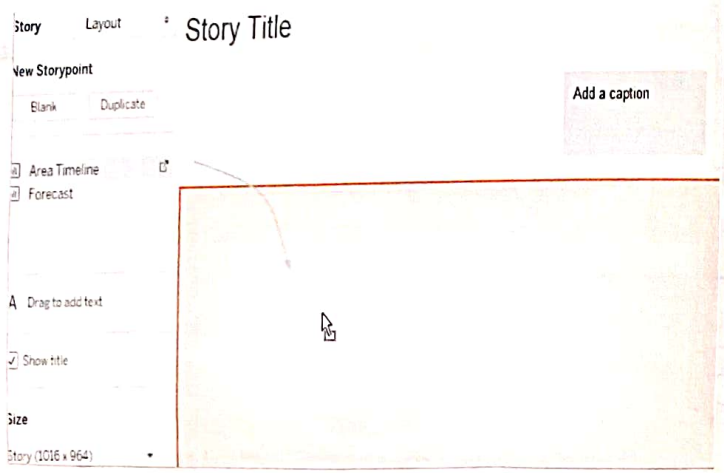
Tableau opens a new story as your starting point:

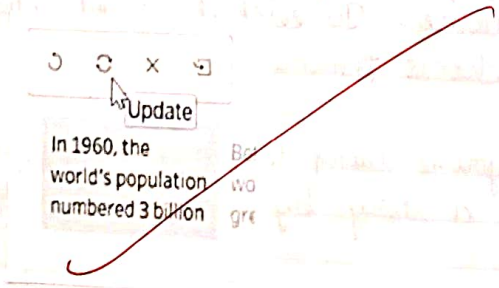
2. In the lower-left corner of the screen, choose a size of your story. Choose from one of the predefined sizes, or set a custom size in pixels:

NOTE: Choose the size your story will be viewed at, not the size you're authoring in.

3. By default, your story gets its title from the sheet name. To edit it, right-click the sheet tab, and choose Rename Sheet.

If you're using Tableau Desktop, you can also rename a story by double-clicking the title.





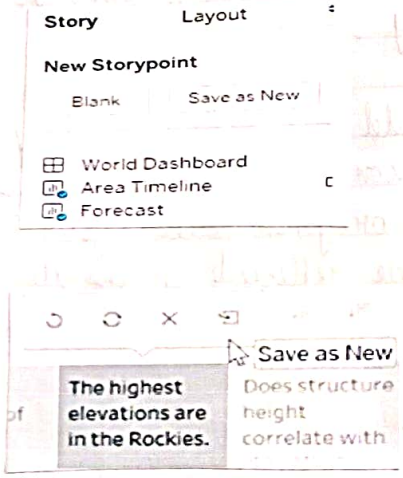
4. To start building your story, double-click a sheet on the left to add it to a story point.
In Tableau Desktop, you can also drag sheets into your story point.

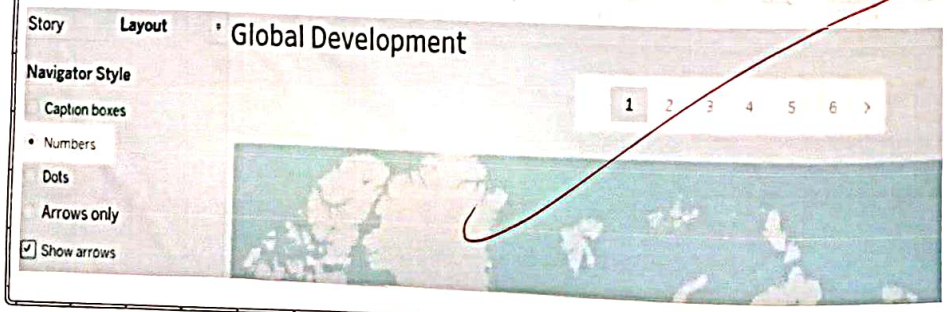
When you add a sheet to a story point, that sheet remains connected to the original sheet. If you modify the original sheet, your changes will automatically be reflected on the story points that use it.

If you are using Tableau Cloud to author on the web and the original sheet has Pause Auto Updates enabled, the story sheet will be blank until auto-updates are resumed.

5. Click Add a caption to summarize the story point.
In Tableau Desktop, you can highlight a key takeaway for your viewers by dragging a text object to the story worksheet and typing a comment.

6. To further highlight the main idea of this story point, you can change a filter or sort on a field in the view. Then save your changes by clicking





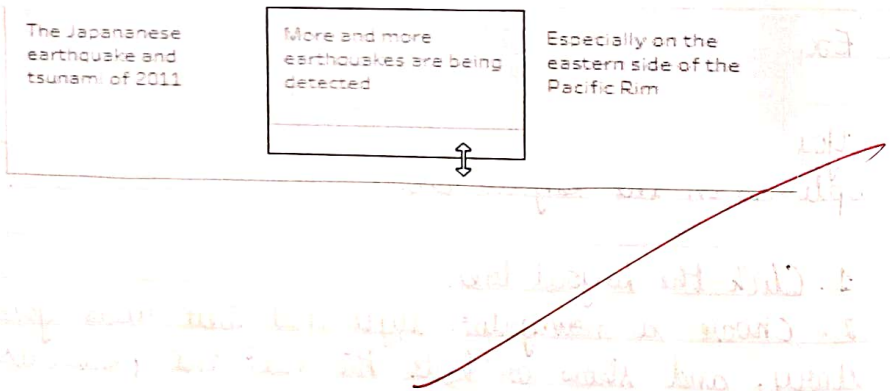
Update on the story toolbar above the navigator box:

7. Add another story point by doing one of the following:
- Click Blank to use a fresh sheet for the next story point.
- Start customizing a story point and click Save as New on the toolbar above the navigator box.
- Click Duplicate to use the current story point as the basis for a new one.

Explore layout options

You can refine the look of your story using the options on the layout tab.

1. Click the layout tab
2. Choose a navigator style that best suits your story, and show or hide the next and previous arrows.



Format a story

Resize captions (Tableau Desktop only)

Sometimes the text in one or more of your captions is too long to fit inside the height of the navigator. In this case, you can re-size the captions vertically and horizontally.

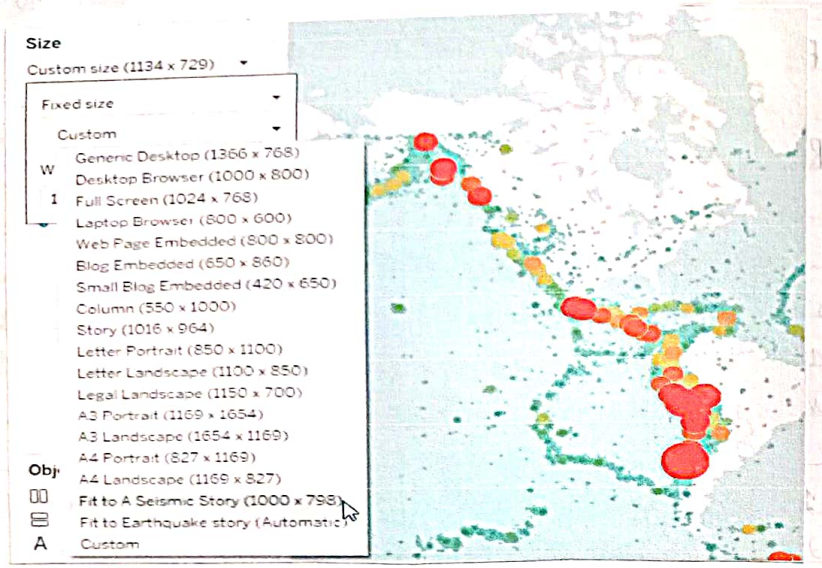
1. In the navigator, select a caption.
2. Drag the border left or right to resize the caption horizontally, down to resize vertically, or select a corner and drag diagonally to resize the caption both horizontally and vertically.

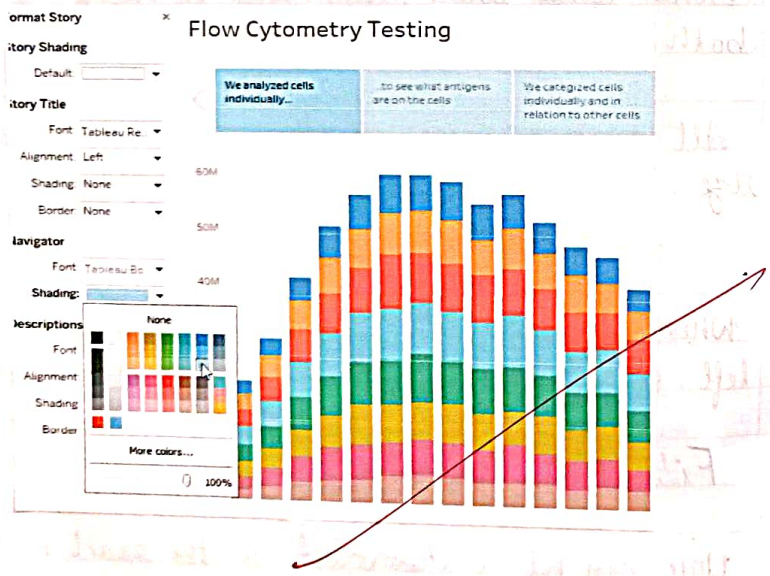
All captions in the navigator update to the new size.

When you resize a caption, you can only select the left, right, or bottom border of the caption.

Fit a dashboard to a story

You can fit a dashboard to the exact size of a story. For example, if you story is exactly 800 by





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600 pixels, you can shrink or expand a dashboard to fit inside that space.

Click the Size drop-down menu and select the story you want the dashboard to fit inside.

Format a story's shading, title, and text objects (Tableau Desktop only)

To open the Format Story pane, select Format > Story.

Clear all formatting (Tableau Desktop only)

- To reset a story to its default format settings, click the Clear button at the bottom of the Format Story pane.
- To clear a single format setting, right-click (Windows) or control-click (macOS) the format setting you want to undo in the Format Story pane. Then select Clear.

For example, if you want to clear the alignment of the story title, right-click (control-click on Mac) Alignment in the Title section, and then select Clear.

Teacher's Signature :

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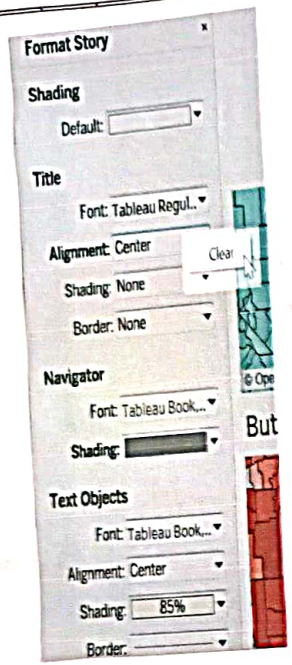

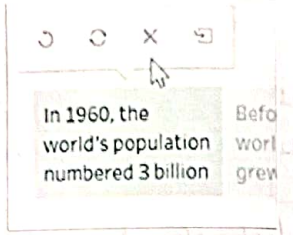

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Delete a story point

Click the X in the toolbar above the point's caption :

Present your story

1. In Tableau Desktop, click the Presentation Mode button on the toolbar. Or, publish the story to Tableau Cloud or Tableau Server, and click the Full Screen button in the upper-right corner of the browser.

2. To step through story, ~~p~~ your story, click the arrow to the right of the story points. Or, in Tableau Desktop, use the arrow keys on your keyboard.

3. To exit Presentation or Full Screen mode, press Esc.

Teacher's Signature : _____

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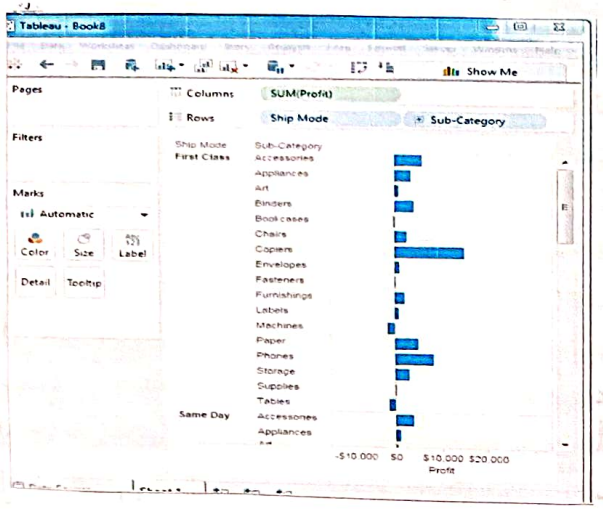
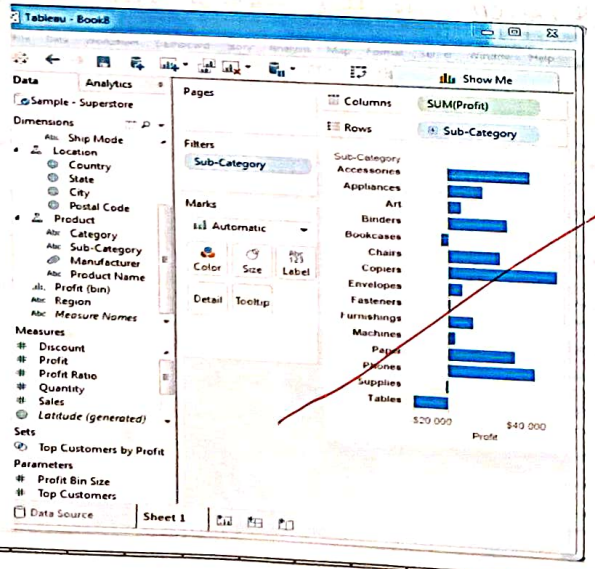




Experiment 04 : Creating a View - formatting charts, adding filters, creating calculated fields and defining parameters.

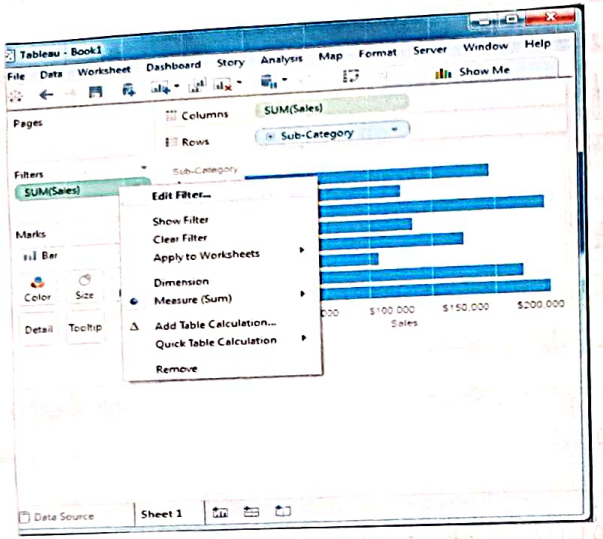
Adding filters.

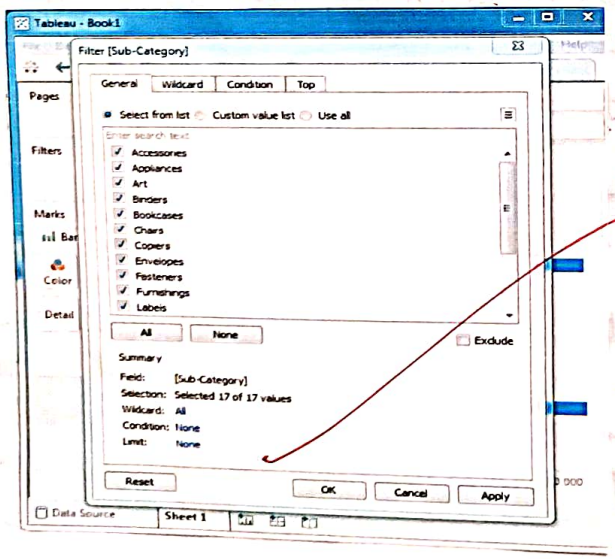
Filtering is the process of removing certain values or range of values from a result set. Tableau filtering feature allows both simple scenarios using field values as well as advanced calculation or context-based filters. In this chapter, you will learn about the basic filters available in Tableau

Example:

We use the Sample - Superstore data source to apply dimension filters on the sub-category of products. We create a view for showing profit for each sub-category of products according to their shipping mode. For it, drag the dimension field "Sub-Category" to the Rows shelf and the measure field "profit to the Columns shelf.

Next, drag the Sub-Category dimensions to the Filters shelf to open the Filter dialog box. Click the None button at the bottom of the list to deselect all segments. Then, select the Exclude option in





the lower right corner of the dialog box. Finally, select Labels and Storage and then click OK. The following screenshot shows the result with the above two categories excluded.

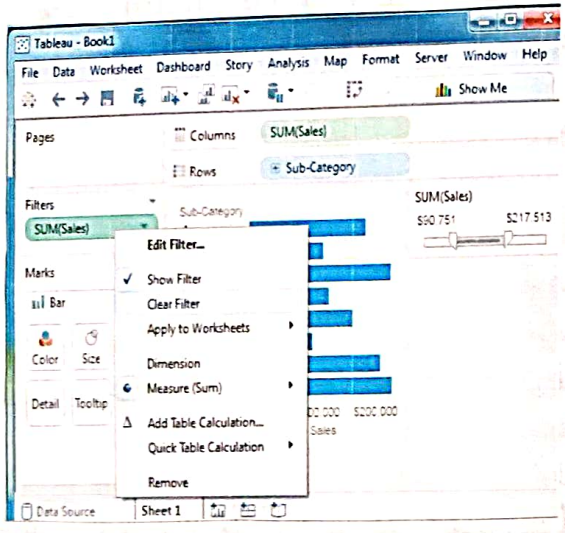
Creating Filters:

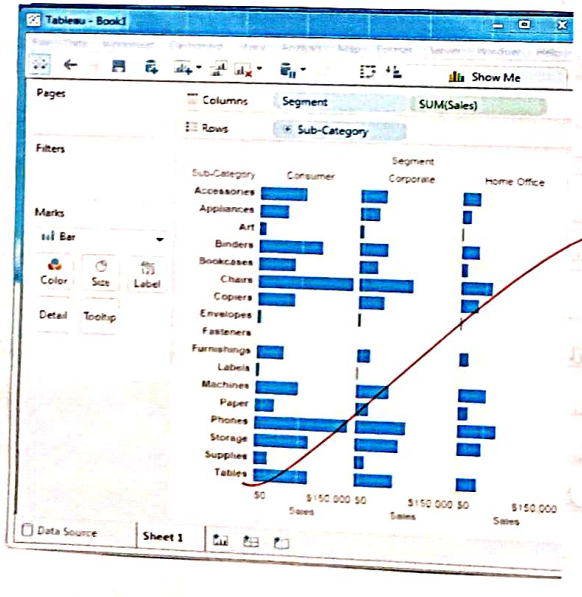
Filters are created by dragging the required field to the Filters shelf located above the Marks card. Create a horizontal bar chart by dragging the measures sales to the Columns shelf and the dimension Sub-Category to the Rows shelf. Again drag the measure sales into the Filters shelf. Once this filter is created, right-click and choose the edit filter option from the pop-up menu.

Creating Filters for Dimensions

Dimensions are descriptive fields having values which are strings. Tableau offers the following types of filters for dimensions.

- Generator Filter: allows to select specific values from a list
- Wildcard Filter: allows to mention wildcards like cha* to filter all string values starting with cha.
- Condition Filter: applies conditions such as sum of sales.





• Top Filter : chooses the records representing a range of top values.

Following worksheet shows these options.

Clearing Filters

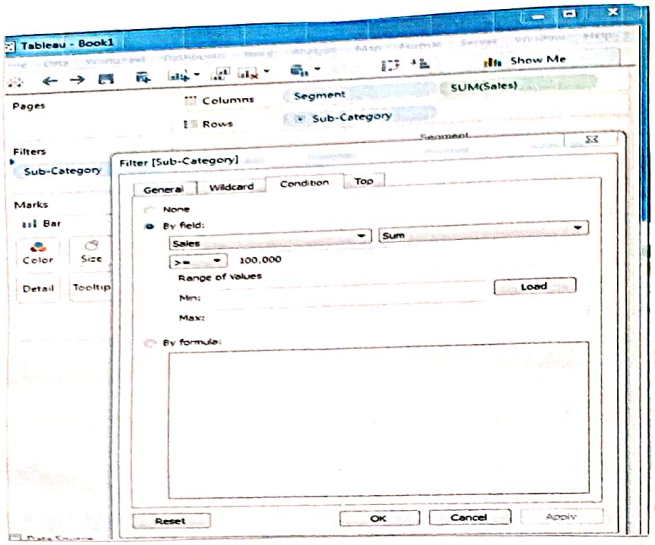
Filters can be easily removed by choosing the clear filter option as shown in the following screenshot.

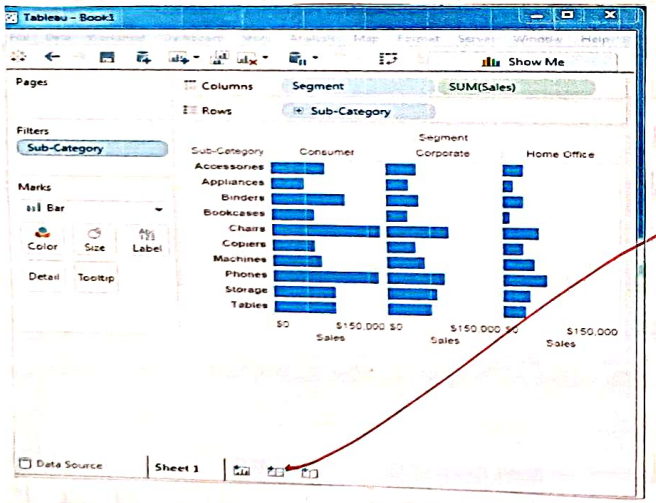
One of the important filtering options in Tableau is to apply some conditions to already existing filters. These conditions can be very simple like finding only those sales which are higher than a certain amount or it can be a complex one based on a certain formula. The conditions can also be applied to create a range filter.

Creating a Condition Filter

Using the Sample-superstore, let's find that sub-category of products across all segments whose sales exceed one million. To achieve this objective, following are the steps.

Step 1 - Drag the dimension segment and the measures Sales to Column Shelf. Next, drag the dimension Sub-Category to





the Rows shelf. Choose the horizontal bar chart option. You will get the following chart.

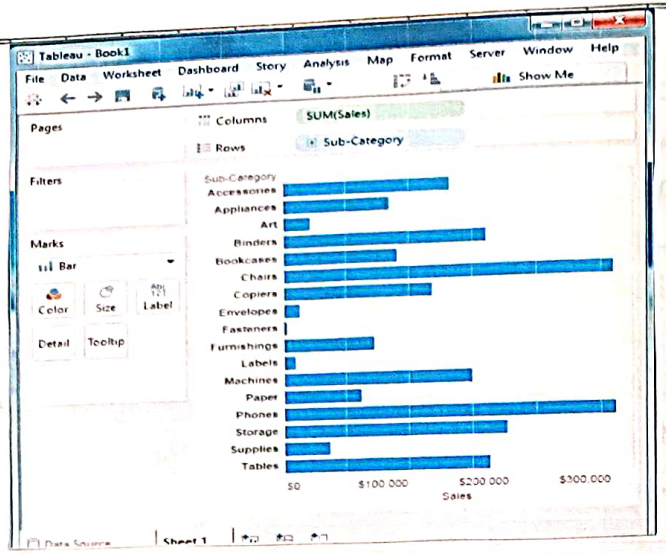
Step 2: Drag the dimensions Sub-Category to the Filters Shelf. Right-click to edit and go to the tab condition. Here, choose the radio option by field. From the drop-down, select Sales, Sum and greater than equal to symbol specifying the value 100000.

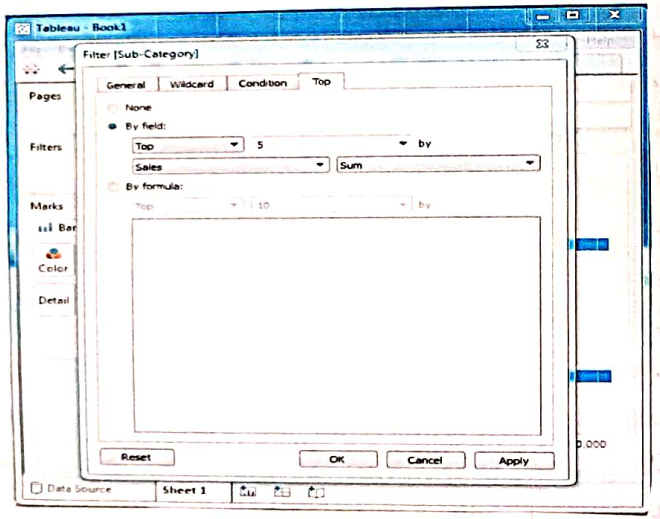
On completion of the above two steps, we get a chart which shows only those subcategory of products, which have the required amount of sale. Also this is shown for all the available segments where the condition is met.

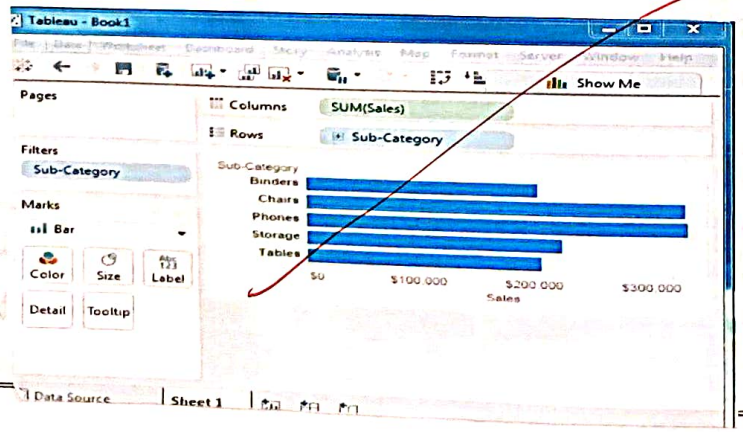
The Top option in Tableau filter is used to limit the result set from a filter. For example, from a large set of records on sales you want only the top 10 values. You can apply this filter using the inbuilt options for limiting the records in many ways or by creating a formula. In this chapter, you will explore the inbuilt options.

Creating a Top Filter

Using the Sample-superstore, find the sub-category of products which represents the top 5 sales amount. To achieve this objective, following







are the steps.

Step 1 - Drag the dimension Sub-Category to the Rows shelf and the Measure Sales to the Columns shelf. Choose the horizontal bar as the chart type. Tableau shows the following chart.

Step 2 - Right-click on the field Sub-Category and go to the tab named Top. Here, choose the second ratio option by field. From the drop-down, choose the option Top 5 by Sum of Sales.

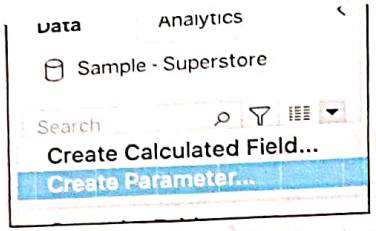
On completion of the above step, you will get the following chart, which shows the top 5 Sub Category of products by sales.

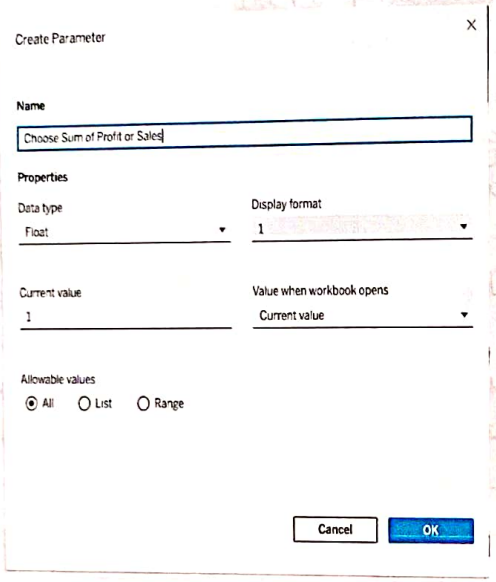
Defining Parameters

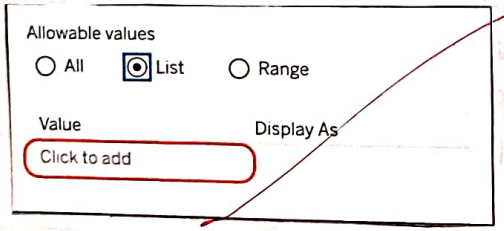
Parameters in Tableau are the workbook variables like a number, date or calculated field that allow users to replace a constant value in a calculation, filter, or reference line

Step 1: Create a Parameter

First, you'll have to create a parameter using the built-in function in Tableau.







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Here's how to do it :

1. In the data pane on the left, Select "Create Parameter" from the drop-down list. A ~~gr~~ popup window will appear.

2. Give your parameter a name like "Choose Sum of Profit or Sales." This makes it more readable for your users.

3. Leave your data type as Float.

4. Select "List" from the "Allowable values" option. In the value table that appears, click on the table that reads "Click to Add."

5. Type in "1" in the first row, press "Enter" and type in "2" in the second row. Press "Enter" again. These are values that will be linked to your calculated field later on.

Teacher's Signature :

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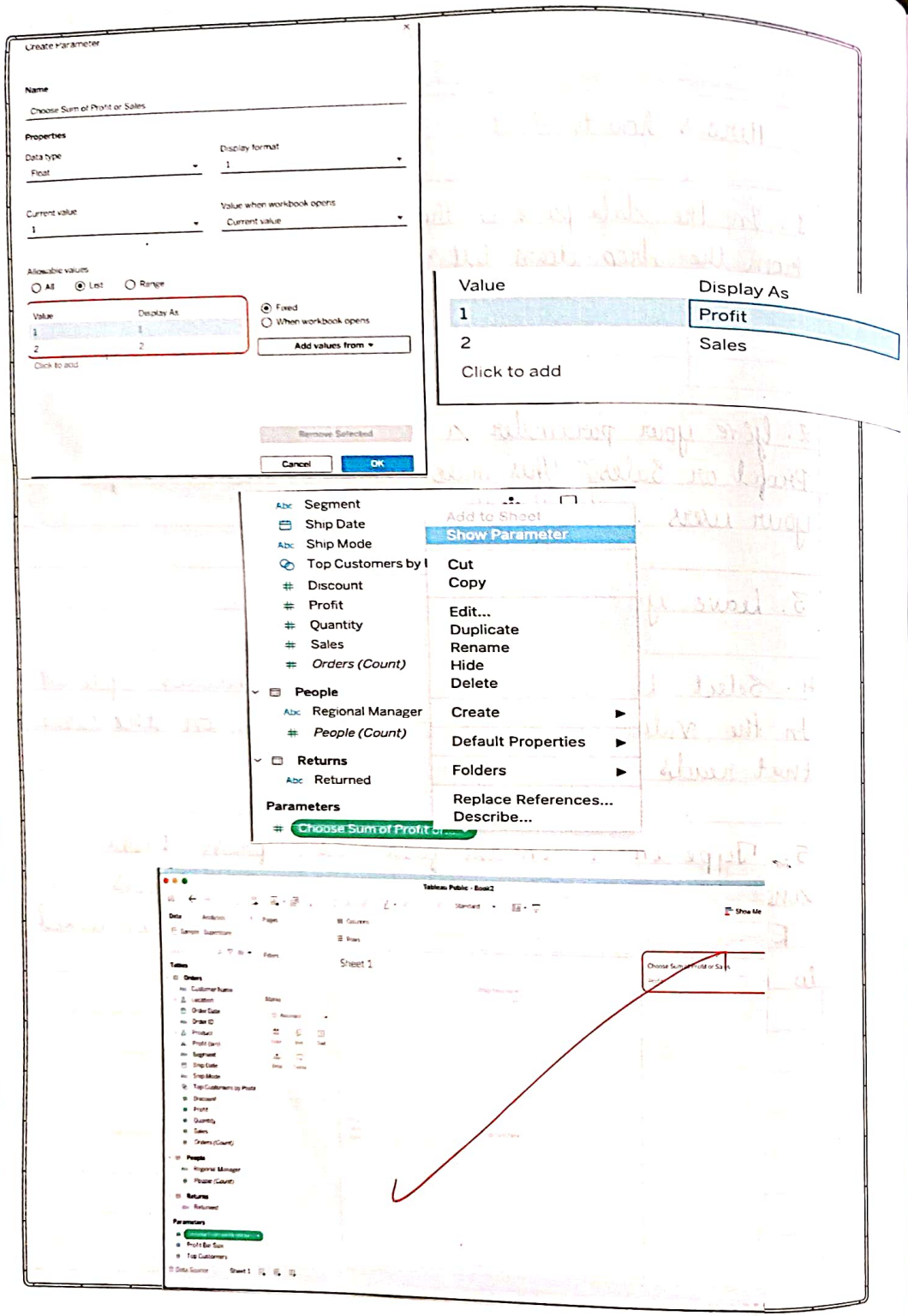

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6. In the "Display As" column in the table, rename the fields to "Profit" and "Sales" respectively as shown in the image below.

7. Click OK to save the parameter

Step 2: Show the Parameter.

Next, you'll want to show the parameter you've just created in your view. This action will be similar to adding a filter to a view.

1. Right-click on the newly created parameter "Choose Sum of Profit or Sales."

2. Click on "Show Parameter". A new parameter control selection box will appear on the right-hand side of the view.

3. Place the parameter control in a convenient location in your dashboard or worksheet.

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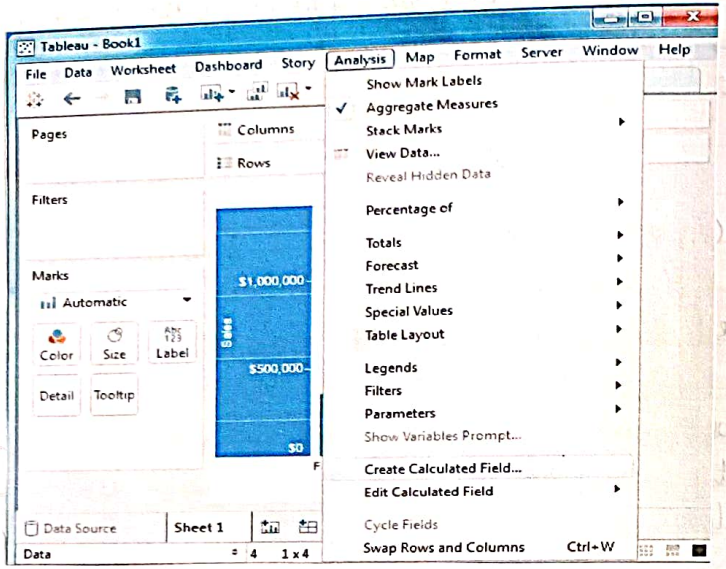
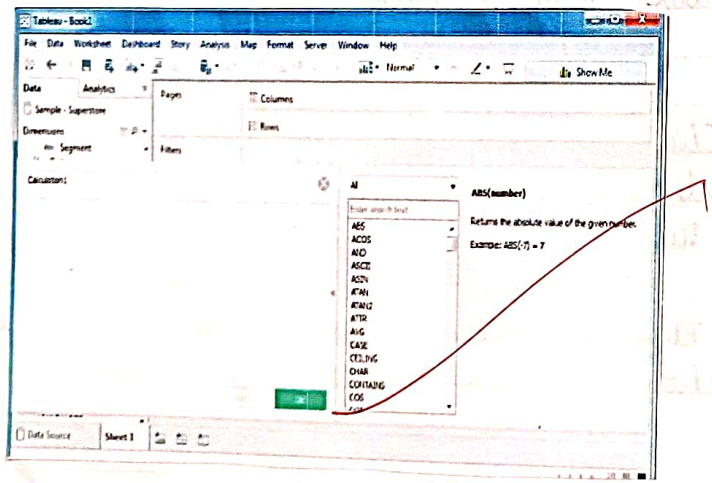




Create a calculated fields

Calculated Fields are one of the most powerful features of Tableau. They provide a way to create new data from existing data.

1. Connect to the sample data superstore and create a new worksheet.

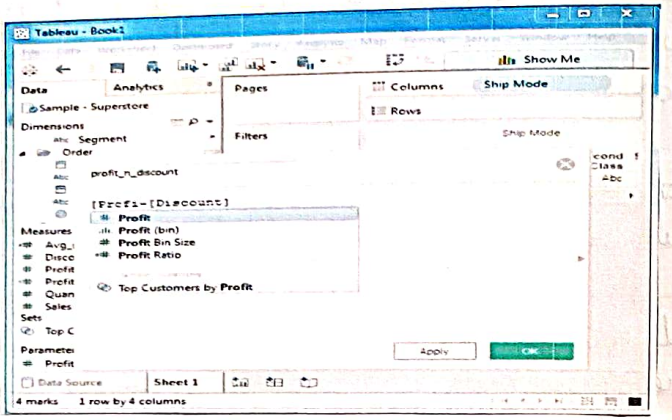
2. Click the drop down to the right of Dimensions on the Data pane and select Create Calculated Field to open the calculation editor.

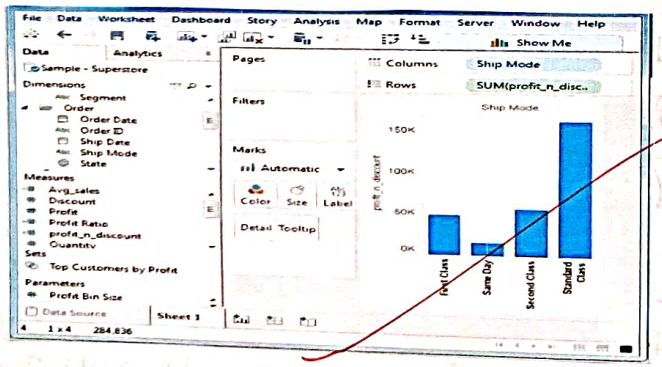
Calculated Field', as shown in the following screenshot.

3. Name a new field 'Discount Ratio' and create the following formula:

IIF([Sales] ! = 0, [Discount] / [Sales], 0)

IIF is used to perform logical tests and return appropriate values. Here we are calculating discount ratio on sales using existing fields sales and discount. If sales are not zero, then the discount ratio will be discount divided by sales. The first parameter [Sales] ! = 0 is the test condition, the second





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parameter [Discount]/[Sales] is the result and third parameter is the result if the condition fails. Here it is given zero.

4. Click Ok to add the new field to the Measures area in the Data pane. The new field is listed under Measures instead of Dimensions because the calculation returns a number.

5. It produces a bar chart showing the difference between profit and discount for different shipping modes.

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MICROSOFT POWER BI

Power BI is a data visualization and data analytics platform moreover it can be a services BI tool developed by Microsoft under the power platform. Power BI is a group of software as services, apps and connectors. The integration of these technologies turns different sources of data into deep insights and static and interactive visualization.

Key components of Power BI

- Power BI Desktop : User can create reports, connect different data sources and do data modelling.

- Power BI Services : Users can share the reports, create a dashboard and collaborate with others.

- Power BI Mobile App : This allow users to access the reports and dashboard on phones.

Advantages of Power BI

1. User-friendly interface : Power BI has an intuitive interface allowing users to visualize and analyze data easily.

2. Data integration : Power BI allows users to easily integrate data from various sources, including Excel, SQL Server, and cloud-based sources like Azure and Salesforce.

3. Customizable dashboards : users can create customized dashboards and reports to display data in a way that is meaningful to them.

4. Real-time data : Power BI supports real-time data processing, which means users can view up-to-date data in their dashboards and reports.

5. Collaboration : Power BI allows users to share their dashboards and reports with others, making collaborating on data analysis projects easy.

Disadvantages Of Power BI

1. Limited data processing capabilities : Power BI is not designed for heavy-duty data processing and may struggle with large datasets or complex queries.

2. Limited customization options : While Power BI offers a range of customization options, users may find that they are limited in their ability to create truly unique visualizations and reports.

3. Cost : Power BI is not a free tool, and users may need to pay for additional features or storage space.

Components of Power BI

1. Power Query

Power Query is the data transformation and mash up the engine. It enables you to discover, connect, combine, and refine data sources to meet your analysis need. It can be downloaded as an add-in for Excel or can be used as part of the Power BI Desktop.

2. Power Pivot

Power Pivot is a data modeling technique that lets you create data models, establish relationships and create calculations. It uses Data Analysis Expression (DAX) language to model simple and complex data.

3. Power View

Power View is a technology that is available in Excel, Sharepoint, SQL Server, and Power BI. It lets you create interactive charts, graphs, maps and other visuals that bring your data to life. It can connect to data sources and filter data for each data visualization element or the entire report.

4. Power BI Desktop

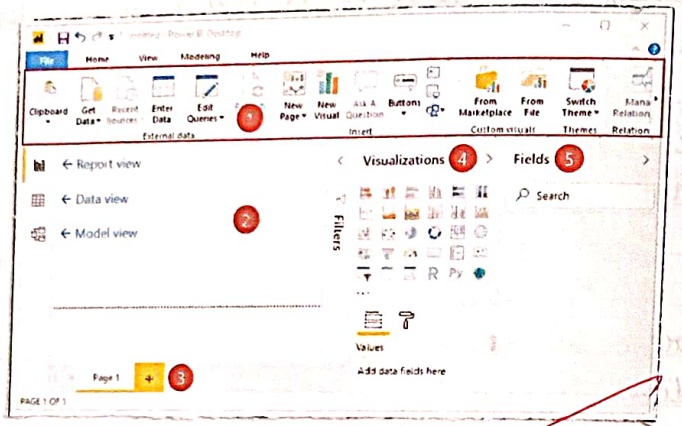
Power BI Desktop is a development tool for Power Query, Power Pivot, and Power View. With Power BI Desktop, you have everything under the same solution, and it is easier to develop BI and data analysis experience.

5. Power Q&A

The Q&A feature in Power BI lets you explore your data in your own words. It is the fastest way to get an answer from your data using natural language. An example could be what was the total sales last year? Once you've built your data model and deployed that into the Power BI website, then you can ask questions and get answers quickly

6. Power Map

Microsoft's Power Map for Excel and Power BI is a 3-D data visualization tool that lets you map your data and plot more than a million rows of data visually on Bing maps in 3-D format from an Excel table or Data Model in Excel. Power Map works with Bing maps to get the best visualization based on latitude, longitude, or country, state, city, and street address information.



Power BI Desktop Interface - The Report View.

Power BI Desktop provides a clean, intuitive interface to build and visualize reports. The report view is split into five main areas:

1. Ribbon - Displays common tasks that are associated with reports and visualizations.

2. Report view, or canvas - where visualizations are created and arranged. You can switch between Report, Data, and Model views by clicking the icons in the left column.

3. Pages tab - Located along the bottom of the page, this area is where you would select or add a report page.

4. Visualizations pane - Where you can change visualizations, customize colors or axes, apply filters, drag fields, and more.

5. Fields pane - Where query elements and filters can be dragged onto the Report view or dragged to the Filters area of the visualizations pane.

Flow of Work in Power BI

The typical flow of work in Power BI can be broken down into several stages:

1. Data Collection / Import : First, you gather data from various sources such as Excel, SQL Server, Share Point, or web services. Power BI Desktop supports numerous data connectors.

2. Data Transformation and Cleaning: You use Power Query in Power BI Desktop to clean, transform, and model of the data. This is done using the "Transform Data" feature to shape the data into a suitable format for analysis.

3. Data Modeling : Create relationships between tables, define calculated columns, and measures using DAX (Data Analysis Expressions). This step is crucial for setting up an efficient data model.

4. Report Creation : Use the Power BI Desktop interface to create reports by selecting visuals such as tables, charts, maps, etc., to represent the data. You can use drag-and-drop features to design the layout.

5. Publishing and Sharing: Once the report is ready, you can publish it to the Power BI Service. From there, you can share reports and dashboards with others within your organization.

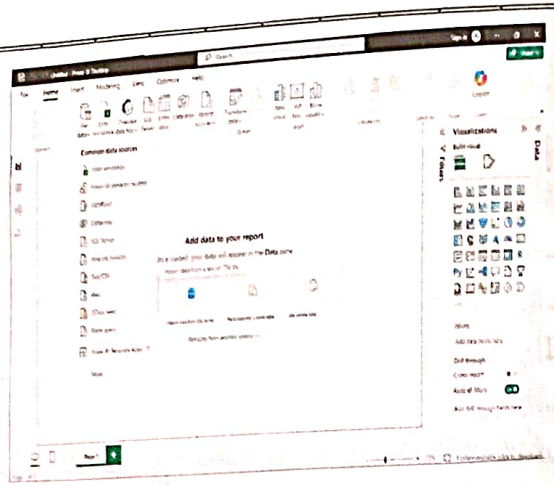
6. Collaboration: In Power BI Service, team members can collaborate, provide feedback, and view the reports in real time. You can also schedule data refreshes to keep reports updated.

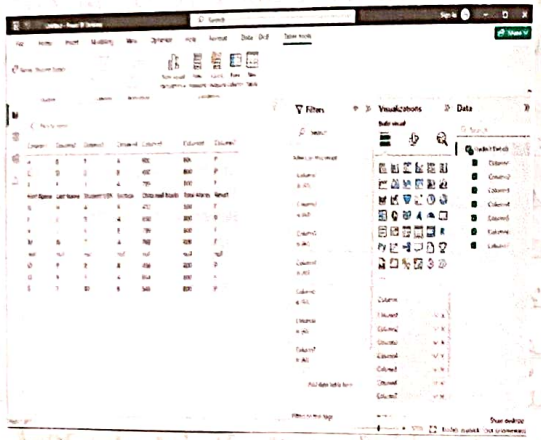
6 Querying Data from CSV - Query Editor, Connecting the data from the Excel Source, Clean, Transform the Data

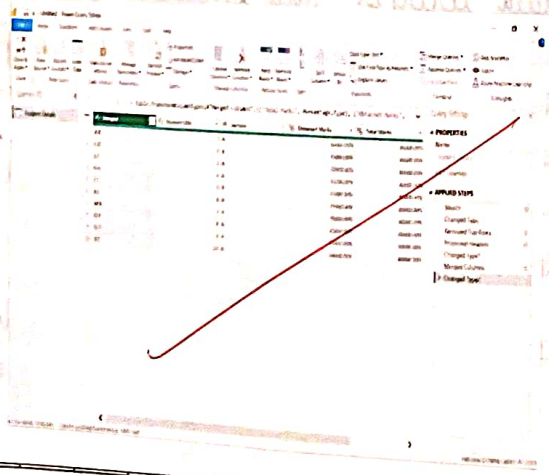
Power BI Desktop is a powerful tool for data analysis and visualization, enabling users to connect to various data sources, including CSV files. The Query Editor within Power BI allows users to clean, transform, and prepare their data for analysis efficiently.

Query Editor: The Query Editor in Power BI is a crucial tool that enables users to prepare and transform data before it is loaded into the Power BI model for analysis and visualization. Its primary purpose is to facilitate the cleaning and structuring of raw data from various sources, ensuring that it is accurate, consistent, and relevant for reporting. One of the standout features of the Query Editor is its ability to connect to a wide range of data sources. This includes files such as CSV and Excel, databases like SQL Server and Oracle, as well as online services and APIs. This versatility allows users to aggregate and analyze data from multiple platforms, creating a comprehensive dataset that enhances the quality of insights.

Power BI is an excellent tool for data analysis, and the Query Editor is essential for preparing your data.







before visualization. This guide provides detailed steps on connecting to a CSV file, cleaning, and transforming the data in Power BI.

Step 1: Connecting to the CSV File

1. Open Power BI Desktop: Launch the Power BI Desktop application.

2. Get Data from CSV:
   - Navigate to the Home tab on the ribbon.
   - Click on Get Data and select Text/CSV from the dropdown menu.
   - In the file explorer, locate and select your CSV file, then click open.

3. Preview Data:
   - After selecting the file, a preview window will display the data.
   - Review the preview to ensure that the data appears as expected (e.g., correct delimiters, headers).

Step 2: Transforming Data in Query Editor

To clean and transform your data, click Transform Data to open the Query Editor.

1. Data Preview Pane:
   - The Query Editor displays your data in a grid format, along with several options for transformation in the ribbon above.

2. Remove Unnecessary Columns:

- If there are columns that you do not need for your analysis, select the columns(s), right-click, and choose Remove Columns.
- Alternatively, you can select multiple columns by holding down the Ctrl key while clicking.

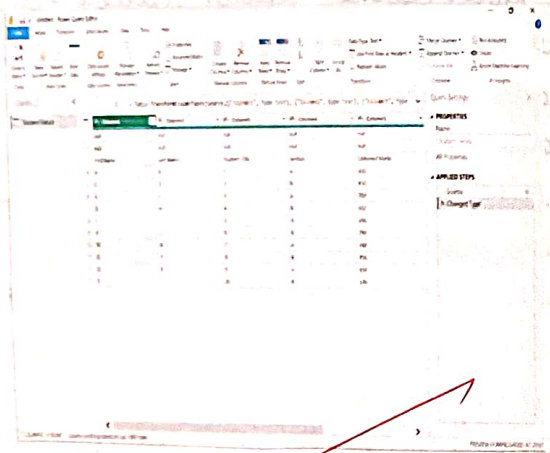
3. Rename Columns:
- To make your dataset clearer, double-click on the column headers to rename them.
- You can also right-click the header and select Rename.

4. Change Data Types:
- Ensure each column has the correct data type:
  - select a column
  - Go to the Transform tab and use the Data Type dropdown to choose the correct type (e.g., Text, Number, Date)
- Changing data types correctly is crucial for ensuring accurate calculations in your analysis.

5. Filter Rows:
- To exclude rows that do not meet specific criteria, click on the dropdown arrow in the column header.
- Apply filters based on conditions (e.g., filter out null values or specific categories).

6. Handle Missing Values:
- Identify missing values in your dataset:
- You can replace them by right-clicking the column and selecting Replace values or remove them by selecting Remove Rows > Remove Blank Rows.

7. Add Calculated Columns:



- If you need to create new columns based on existing data:
  - Go to the Add Column tab.
  - Select Custom Column and enter a formula using M language to derive new values.
  - This is useful for calculations like percentages, concatenations, or categorizing data.

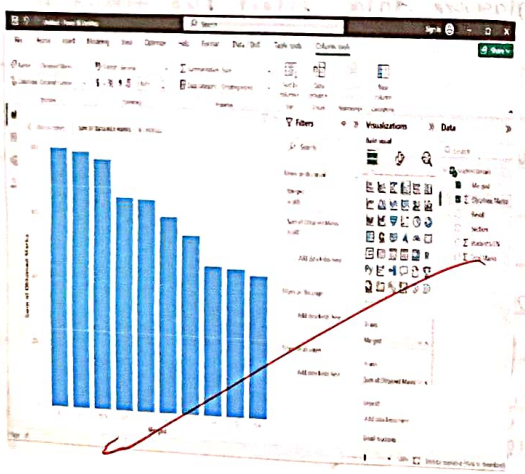
8. Sort Data :
   - You can sort data by selecting a column and clicking the sort icons (ascending or descending) in the column header.

9. Group Data:
   - To summarize data, select the Home tab and click on Group By.
   - Configure grouping options by selecting the column to group by and specifying aggregation methods (e.g. sum average).

Step 3: Applying Changes.

After performing all necessary transformations:

1. Close & Apply:
   - click Close and Apply in the Home tab of the Query editor
   - This action saves your transformations and loads the cleaned data into Power BI for analysis.



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Step 4 : Visualizing the Data

Once the data is loaded :

1 Create Visualizations:

- use the Fields pane to drag and drop fields onto the report canvas.
- Choose various visualization types (e.g., table, charts, maps) to represent your data visually.

2. Explore Insights :

- Analyze the visualizations, filter data, and create reports based on the transformed dataset.

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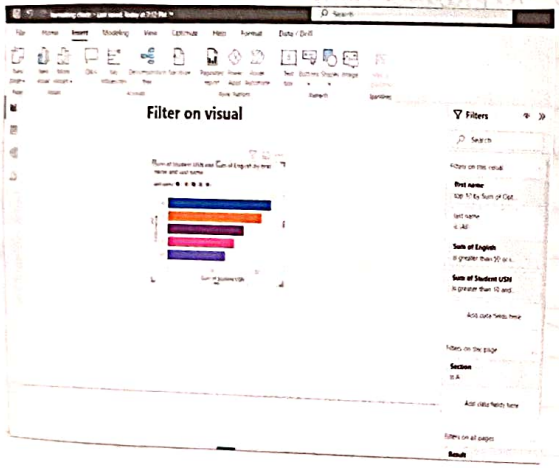
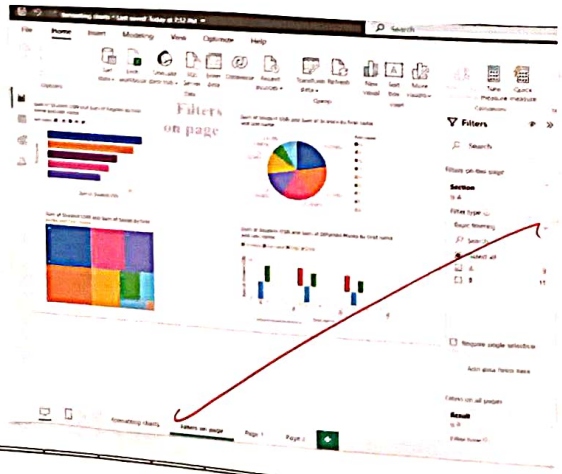




8 Dashboards - Filters in Power BI, Formatting dashboards

Filters in Power BI

Filters refine data displayed on visuals, pages, or reports. Below is a detailed explanation of each type:

1 Visual - Level Filters

Visual - level filters apply only to specific charts or tables.

Steps to Add Visual - Level Filters:

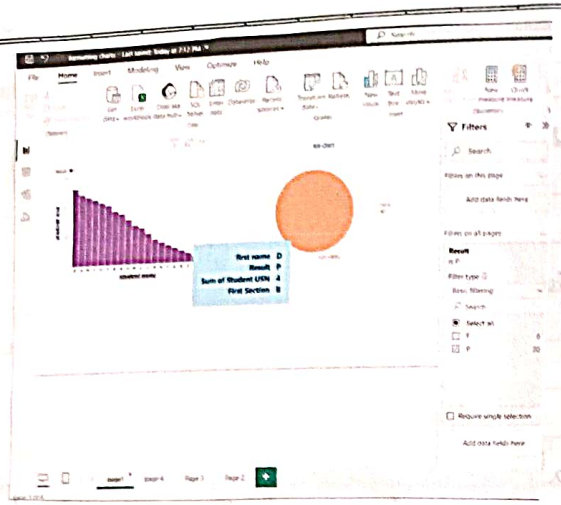
1. Select the visual you want to filter.
2. Go to the Filters pane on the right.
3. Drag the desired field into the "Filters on this visual" section.
4. Configure filter conditions:
   - Choose filter type: Basic, Advanced, Top N, etc.
   - Set values to include / exclude.

2. Page - Level Filters

Page - level filters impact all visuals on a single page.

Steps to Add Page - Level Filters:

1. Open the Filters pane.
2. Drag the desired field into the "Filters on this page" section
3. Define filter conditions as needed.



3. Report - Level Filters

These filters affect all pages within the report.

Steps to Add Report - Level Filters ;

1. Open the Filters pane.
2. Drag a field into the "Filters on all pages" section.
3. Configure the filter settings.

Formatting Dashboards

Formatting ensures the dashboard is professional, readable and visually appealing.

1. General Dashboard Formatting

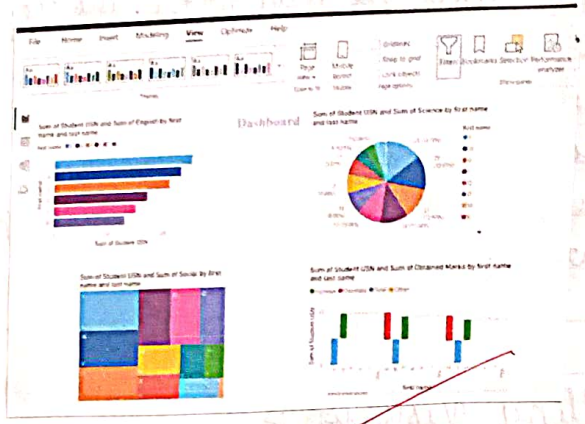
Steps to Format a Page:

1. Go to the View tab.
2. Adjust settings :
   - Page Size : Choose "16:9" for wide screens or "Custom" for specific dimensions
   - Canvas Background : Add colors or images to the page.

2. Formatting Visuals

Steps to Format individual visuals.

1. Select a visual and go to the Format Visual pane.
2. Adjust the following :
   - Data Colors :
     - Assign colors based on category or value.



- Use conditional formatting for dynamic color changes
- Titles:
  - Add meaningful titles (e.g., "Total Sales by Region").
  - Customize font size, style, and alignment.
- Borders:
  - Use borders sparingly to define visuals.
  - Adjust radius for rounded corners

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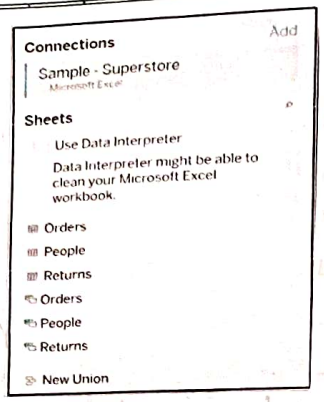
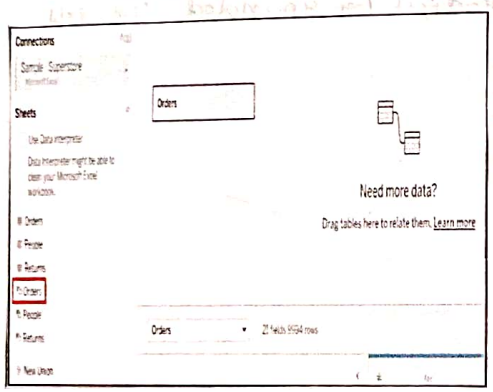
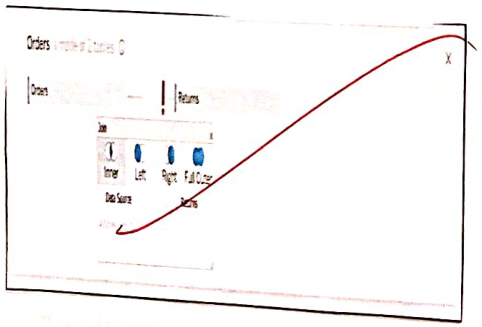






Experiment 2

Connecting to Data Source - Connecting to Database, Different types of Tableau Joins.

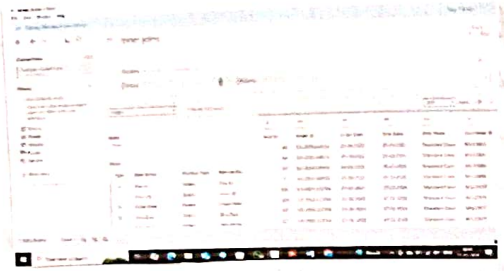
What is Join in Tableau?

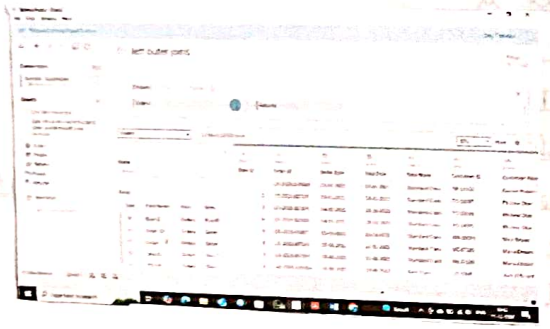
A join in Tableau means combining columns from one or more tables in a relational data base. It also creates a set that can be saved as a table, or it can be saved as it is.

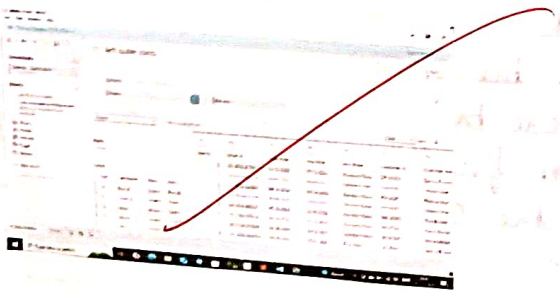
How to create a Join in Tableau?

- Connect the relevant data sources.
- Here, we will use the sample superstore data
- Drag the first table to the canvas.
- Here, the order table

1. Select open from the dropdown to open the join canvas.
   - Join canvas looks like this
   - Double click or drag another table to the join canvas.
   - Here the second table will be Return
   - Choose the desired join which you want
   - When finished, close the joined dialogue and join the canvas.







Types of Join

Tableau offers 4 types of join: inner, left, right and full outer join.
Let's discuss them one by one:

1. Inner Join

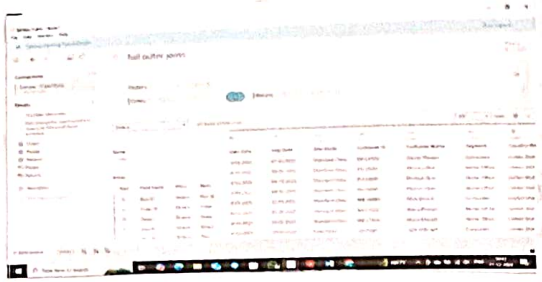
Inner join combines the table that contains values that has matches in both the table. when a value doesn't match across both the table, it dropped entirely.

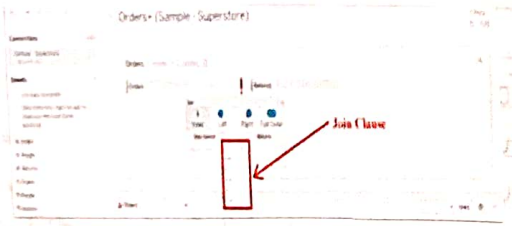
2. Left Join

Left join combines all the values from the left table and corresponding matches from the right table. when the value in the left table doesn't have a corresponding match in the right table. you will see a null value in the grid.

3. Right Join

Right join combines all the values from the right table and corresponding matches from the left table. when the value in the right table doesn't have a corresponding match in the left table, you will see a null value in the grid.





4. Full Outer join

Full outer join combines all the values from both the tables. When a value from either of the table doesn't have a match with the other table, you will see a null value in the grid.

2.1 Understanding Join Clause

While joining the two tables, we get

Join clauses are an expression that helps tableau to identify shared files between tables and methods to match the corresponding rows.
Join clause most often use the equality operator (=) which matches rows with the same value. There are other operations like <>, <, <=, >, >=.

9. Analysis of revenue in sales dataset :

i) Create a chloropleth map (fill the map) to spot the special trends to show the state which has the highest revenue.

ii) Create a line chart to show the revenue based on the month of the year.

iii) Create a bin of size 10 for the age measure to create a new dimension to show the revenue.

iv) Create a donut chart view to show the percentage of revenue per region by creating zero access in the calculated field.

v) Create a butterfly chart by reversing the bar chart to compare female and male revenue based on product category.

vi) Create a calculated field to show the average revenue per state and display profitable and non-profitable state.

vii) Build a dashboard.

i) Create a chloropleth map (fill the map) to spot the special trends to show the state which has the highest revenue.

Creating a chloropleth map in Tableau to visualize which state has the highest revenue involves the following steps:

1. Load Your Data :

· Open Tableau and load the dataset that contains revenue information by state.

· Ensure the data includes columns for:

· State names (or their codes, eg., "California" or "CA").

- Revenue for each state.

2. Set Up the Map:

- Drag the State field to the Columns or Rows shelf or directly onto the canvas.
- Tableau should automatically generate a map if the State field is recognized as a geographic role. If not:
  - Right-click on the State field in the Data Pane.
  - Select Geographic Role > State.

3. Color by Revenue:

- Drag the Revenue field onto the Color mark on the Marks Card.
- Tableau will now shade each state based on its revenue.

4. Customize the Color Scheme:

- Click the Color mark card and select Edit Colors
- Choose an appropriate gradient color scheme (e.g., from light to dark shades) to emphasize difference in revenue.

5. Sort and Label the Highest Revenue:

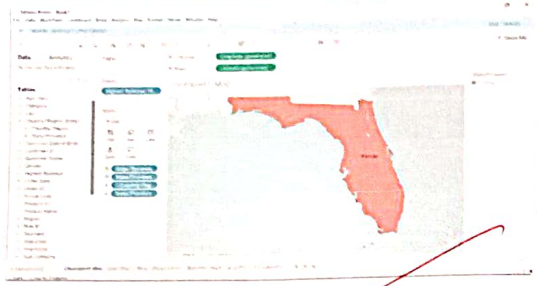
- Optionally, drag the Revenue field onto the Label mark card to display the revenue values on the map.
- To highlight the highest revenue state:
  - Create a calculated field: IF [Revenue] = {FIXED: MAX ([Revenue])} THEN 'Highest Revenue' ELSE 'Other' END.
  - Drag this field to the Detail or Color mark card to differentiate it.

6. Enhance the Map:

- Add a title, tooltips, and any necessary annotations for clarity.
- Adjust map settings under Map > Map Layers to show borders.

Index

S. No.	Name of the Experiment	Page No.	Date of Experiment	Date of Submission	Remarks
10.	Analysis of GDP datasets	81-85	29/11/24	3/12/24	✓
11	Analysis of HR Dataset	86-92	3/12/24	10/12/24	✓
12	Analysis of Amazon-Prime Dataset	93-95	10/12/24	14/12/24	✓



labels, or geographic boundaries as needed.

7. Analyze the Trends :

- use filters, tooltips, or a dashboard to explore and present insights about revenue distribution across states.

ii) Create a line chart to show the revenue based on the month of the year.

Creating a line chart in Tableau to show revenue based on the months of the year involves these steps:

1. Load Your Data :

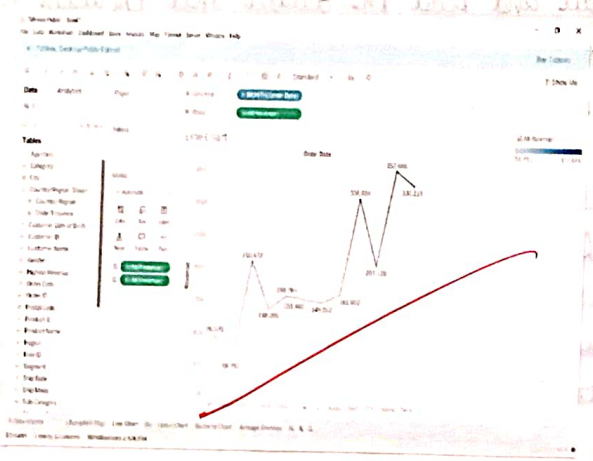
- Open Tableau and load the dataset that includes revenue and date information.
- Ensure the data has columns for:
  - Date : A date or datetime field.
  - Revenue : The revenue associated with each date.

2. Set up the Line Chart:

- Drag the Date field to the Columns shelf.
  - Tableau will default to showing the date by year.
  - Click on the Date field in the Columns shelf and change its level of detail to Month (either as 'Month' or 'Month of Date');
- Drag the Revenue field to the Rows shelf.

3. Adjust the Date Field :

- To ensure that months from all years are aggregated:
  - Right-click the Date field in Columns and select Convert to Discrete or use a calculated field like DATENAME('month', [Date]).
- This will display months as text (eg., January, February).



- If working with multiple years and you want separate lines for each year, ensure the year is included as part of the detail or color.

4. Customize the Chart:

- Set the Marks type to line in the Marks card dropdown.
- If you have data across multiple years, drag the year field onto the Color mark card to display separate lines for each year.
- Add labels if necessary by dragging the Revenue field onto the label mark card.

5. Sort and Format:

- Ensure that the months are ordered chronologically:
  - If Tableau doesn't order them correctly, sort them by the month number (MONTH([Date])).
- Adjust axis titles, fonts, and colors for better presentation.

6. Enhance the Visualization:

- Add tooltips to display detailed revenue information for each point.
- Include filters or dashboard actions to allow the user to drill down into specific months or years.

iii) Create a bin of size 10 for the age measure to create a new dimension to show the revenue.

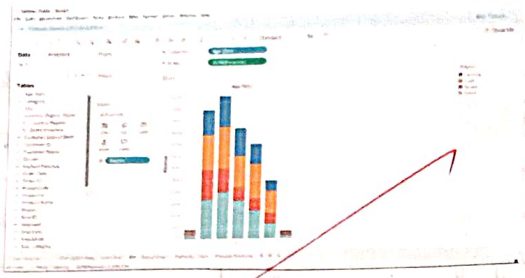
To create a bin of size 10 for the Age measure and use it to visualize revenue in Tableau, follow these detailed steps:

1. Create a Calculated Field for Age Bins
- In Tableau, right-click on the Age field in the Data Pane.
- Select Create > Calculated Field.
- In the dialog box, enter a name for the field (e.g., Age (Custom Bins)).
- Use the following formula to group ages into bins of size 10:
  - DATEDIFF ('year', [Customer Date of Birth], TODAY())

This formula divides the Age by 10, and then multiplies it back by 10 to create ranges like 0-10, 10-20, etc.
- Click OK.

2. Build the Visualization
- Drag the Calculated Field (Age (Custom Bins)) onto the Columns shelf.
  - This will group ages into bins like 0, 10, 20, etc.
- Drag Revenue onto the Rows shelf.
  - Tableau will display total revenue for each age bin.
- Change the chart type to Bar Chart or any other format you prefer.

3. Customize the Visualization
- Sort Bins:
  - Ensure bins are sorted numerically. Tableau typically handles this automatically for numeric bins.
- Add Colors and Labels:
  - Drag Revenue to the Label and Color mark cards to add text and color gradients.



- Adjust Axis Titles :
  - Rename the x-axis and chart title to make the visualization clear (e.g., "Revenue by Age Group (Bins of 10)").

4. Insights from the Visualization
- This chart will show revenue distribution across age groups, helping identify high-performing segments (e.g. 30-40 age group).

IV) Create a donut chart view to show the percentage of revenue per region by creating zero access in the calculated field.

To create a donut chart in Tableau to show the percentage of revenue per region using a calculated field for the zero axis, follow these steps:

1. Prepare Your Data
- Ensure your dataset includes :
- Region : A categorical field.
- Revenue : A numerical measure.

2. Create a Calculated Field for the Zero Axis
- This calculated field will allow you to create the dual-axis structure for the donut chart.
  - Right-click in the Data Pane and select Create > Calculated Field.
  - Name the field (e.g., Zero Axis
  - Enter the following formula :

    0
  - click OK

3. Build the Donut Chart

Step 1: Create a Pie Chart

1. Drag the Region field onto the Color mark card.
2. Drag the Revenue field onto the Angle mark card.
   - This will create a pie chart where each slice represents the revenue contribution of a region.

Step 2: Add a Dual-Axis for the Donut Effect

1. Drag the newly created Zero Axis calculated field onto the Rows shelf.
2. Right-click the axis for the Zero Axis field and select Dual Axis.

Step 3: Synchronize Axes

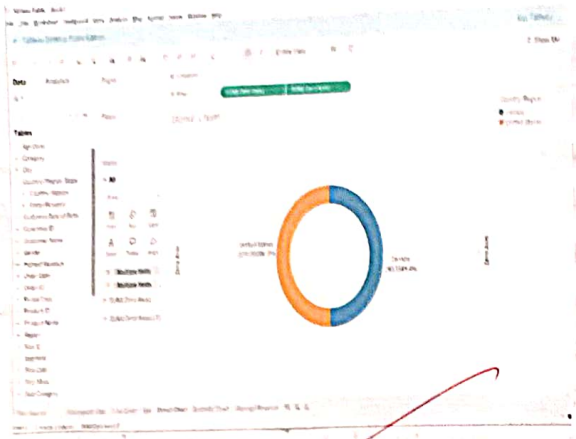
1. Right-click the axis again and select Synchronize Axis.
2. Hide the axis headers by right-clicking and deselecting Show Header.

Step 4: Customize the Marks

1. In the Marks card, you will now see two layers:
   - one for the pie chart: Ensure it is set to the Pie chart type.
   - one for the zero axis: Set it to a Circle chart type.
2. In the zero-axis layer:
   - Reduce the size of the circle using the Size slider. This creates the "hole" in the middle of the donut chart.

5. Customize the Donut Chart

- Adjust Colors: Use distinct colors for each region to make the chart visually appealing.
- Add Tooltips: Display detailed information like absolute



revenue and percentage.

- Edit Title : Add a meaningful title, e.g., "Revenue Distribution by Region (%)."

v) Create a butterfly chart by reversing the bar chart to compare female and male revenue based on product category.

To create a butterfly chart in Tableau that compares male and female revenue based on product category, follow these steps:

Step 1: Prepare Your Data

Ensure your dataset includes:

- Product Category
- Gender (e.g., "Male" and "Female")
- Revenue.

Step 2: Create Calculated Fields

1. Male Revenue:

tableau

Copy code

```
IF [Gender] = "Male" THEN [Revenue] END
```

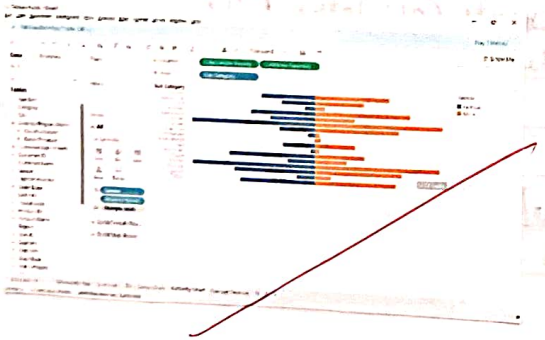
2. Female Revenue (Reversed):

tableau

Copy code

```
IF [Gender] = "Female" THEN [Revenue]* -1
```

These calculations exclude rows that don't match the gender condition, so no need for an ELSE clause.



Step 3 : Build the Butterfly Chart

1. Drag Fields to Shelves :
   - Drag Product Category to the Rows shelf.
   - Drag Male Revenue to the Columns shelf.
   - Drag Female Revenue to the Columns shelf.
2. Customize the Bars :
   - Drag Gender to the Color card to differentiate male and female bars.
   - Right-click on the Female Revenue axis and select Edit Axis to ensure the reversed values display correctly.

Step 4 : Format and Enhance

1. Synchronize Axes :
   - Right-click the axis for Male Revenue and Female Revenue and ensure they share the same scale.
2. Sort Product Categories :
   - Right-click on Product Category, select Sort and sort by total revenue (descending).
3. Add Labels :
   - Drag Revenue to the Label card in the Marks pane to display values.
4. Add Tooltips :
   - Customize tooltips to display revenue comparisons clearly.

vi) Create a calculated field to show the average revenue per state and display profitable & non-profitable state.

To achieve this in Tableau, you need to create calculated fields for Average Revenue Per State and categorize states into

Profitable and Non-Profitable based on certain criteria (e.g., profitability threshold). Here's how you can do it step-by-step:

Create a Calculated Field for Average Revenue Per State

1. Go to the Analysis menu and select Great Calculated Field.
2. Name the calculated field as Average Revenue per State
3. Use the following formula :

AVG([Revenue])

This calculates the average revenue for each state.

4. Click OK.

2. Create a Calculated Field for Profitability

1. Create another calculated field and name it Profitability Status.
2. Use the formula :

tableau

Copy code

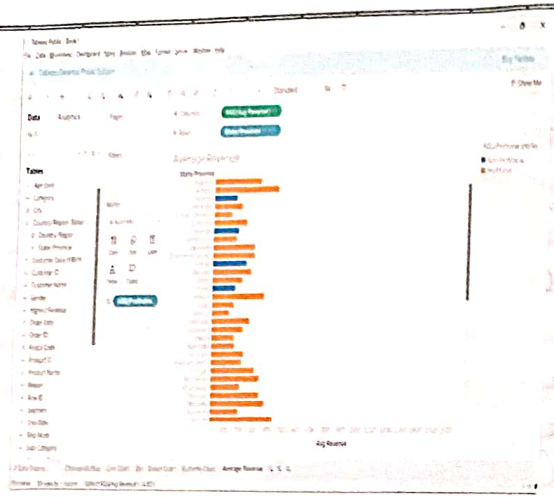
```
IF SUM([Profit]) > 0 THEN
  "Profitable"
ELSE
  "Non-Profitable"
END
```

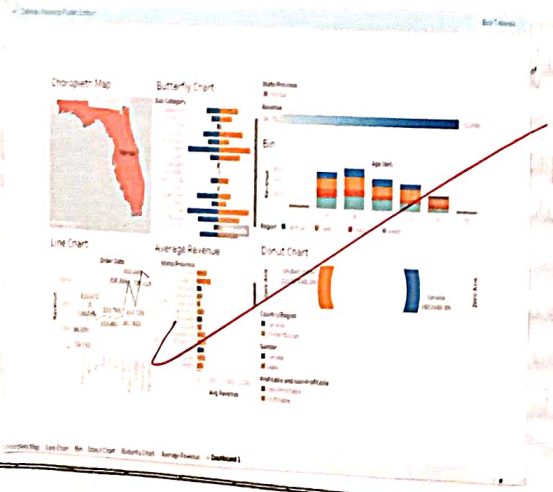
- Replace [Profit] with the field that holds your profit data.
- This field categorizes states as Profitable or Non-Profitable

3. Click OK.

3. Build the Visualization

1. Drag the State dimension to the Rows shelf.
2. Drag the Average Revenue Per State calculated field to the





Columns shelf.

3. Drag the Profitability Status calculated field to the Color card in the Marks pane to differentiate between Profitable and Non-Profitable states.

vii) Build a dashboard

Combine all the views for interactive analysis.

1. Go to the Dashboard tab.
2. Drag the worksheets (choropleth map, line chart, butterfly chart, donut chart, etc.) to the dashboard canvas.
3. Add filters:
   - Drag a Region, Product Category, or State field to the Filters pane.
   - Make filters interactive by enabling the "Apply to Worksheets" option.
4. Use floating containers to organize the dashboard layout.
5. Add titles, legends, and tooltips for better interpretation.

10. Analysis of GDP dataset :

i) Visualize the countries data given in the dataset with respect to latitude and longitude along with country name using symbol maps.

ii) Create a bar graph to compare GDP of Belgium between 2006-2026.

iii) Using pie chart, visualize the GDP of India, Nepal, Romania, South Asia, Singapore by the year 2010.

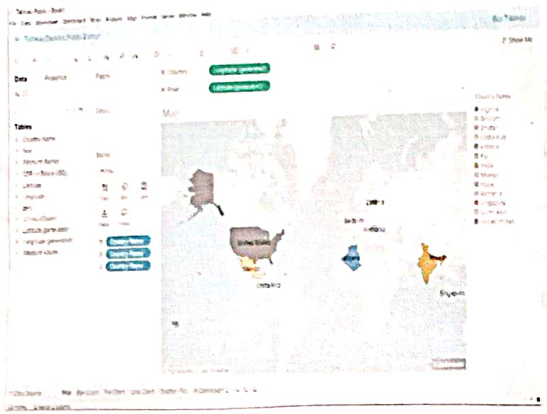
iv) Visualize the countries Bhutan & Costa Rica competing in terms of GDP.

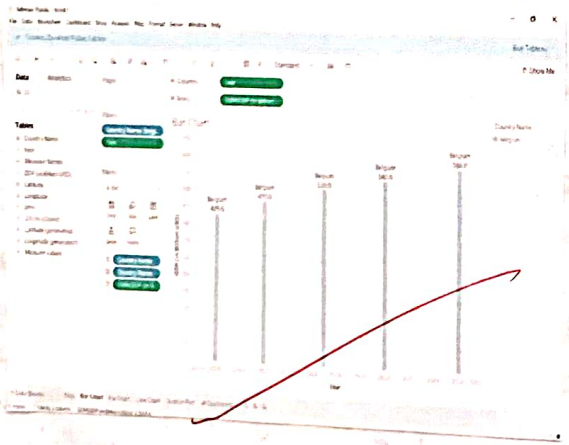
v) Create a scatter plot or circle views of GDP of Mexico, Algeria, Fiji, Estonia from 2004 to 2006.

vi) Build an interactive dashboard.

i) Visualize the countries data given in the dataset with respect to latitude and longitude along with country name using symbol maps.

1. Load the Dataset :
   - Open Tableau and connect to the dataset (CSV file).
2. Drag & drop the Country Name into Detail under Marks section.
   - Tableau will automatically generate a map visualization.
   - Drag the Country Name field to the Label shelf under Marks. This will display country names on the map.
   - Drag additional fields (like GDP or year) to Color or Size under the Marks pane to enhance the Map.
   - Adjust the Symbol size by clicking the Size Option in the Marks pane.





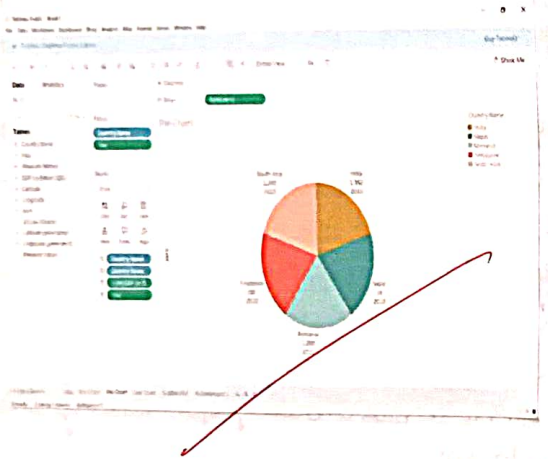
3. Format the Map:
   - Go to the Map menu and select Map Layers.
   - Customize background styles, borders, and more.

ii) Create a bar graph to compare GDP of Belgium between 2006 - 2026.

1. Filter of Belgium:
   - Drag the Country field to the Filters shelf.
   - In the filter dialog, select Belgium and click OK.
2. Filter for Years 2006 - 2026:
   - Drag the Year field to the Filters shelf.
   - Set a Range of Values for years between 2006 and 2026.
3. Build the Bar Chart:
   - Drag Year to the Columns shelf. Tableau will automatically use the year data for the X-axis.
   - Drag GDP (in Billion USD) to the Rows shelf. Tableau will plot the GDP values on the Y-axis.
   - This will create a basic bar graph showing GDP over the years for Belgium.
4. Add Labels to the Bars:
   - Click on the Label shelf in the Marks pane and drag GDP (in Billion USD) to it.
   - This will display the GDP values on top of each bar.

iii) Using pie chart, visualize the GDP of India, Nepal, Romania, South Asia, Singapore by the year 2010.

1. Filter for Year 2010:



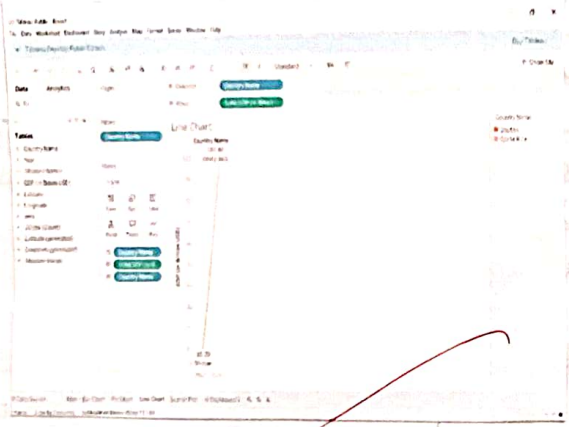
- Drag the Year field to the Filters shelf.
- In the filter dialog, select 2010 and click OK.

2. Filter for Specific Countries:
- Drag the Country field to the Filters shelf.
- In the filter dialog, select India, Nepal, Romania, South Asia, and Singapore (the countries you want to visualize).

3. Create Calculated Field:
- Name it as Zero Axis and type 0.
- Drag and drop Zero Axis into Row Shelf.
- In the Marks dropdown menu (located to the left of the Rows shelf), select Pie as the chart type.
- Drag GDP (in Billion USD) to the Label shelf under the Marks pane.
- This will display the GDP values on the pie chart slices.
- you can adjust the colors of each slide by dragging Country to the Color shelf.

iv) Visualize the countries Bhutan and Costa Rica competing in terms of GDP.

1. Filter for Bhutan and Costa Rica:
- Drag the Country field to the Filters shelf.
- In the filter dialog, select Bhutan and Costa Rica and click OK.
- Drag country to the Columns shelf. This will display



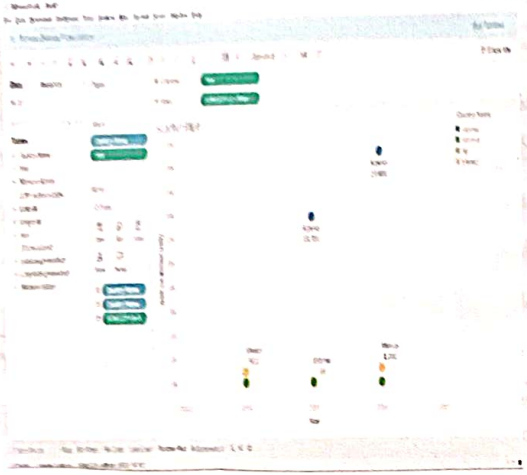
each country on the x-axis.

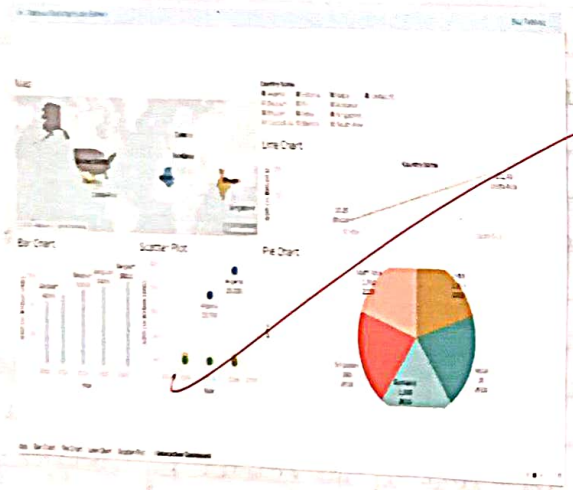
- Drag GDP (in Billion USD) to the Rows shelf. This will display the GDP values on the y-axis.
- In the Marks dropdown menu, make sure Bar is selected (this should be the default).
- This will create a bar chart comparing the GDP of Bhutan and Cost Rica.
- Drag GDP (in Billion USD) to the Label shelf in the Marks pane.
- This will display the GDP values on top of the bars for each country.

V) Create a scatter plot or circle views of GDP of Mexico, Algeria, Fiji, Estonia from 2004 to 2006.

1. Create the Scatter plot :

- Drag Fields to Create Scatter Plot :
  - Drag Year to the Columns shelf.
  - Drag GDP to the Rows shelf.
  - Drag the Country field to the Color shelf in the Marks card to distinguish each country with a different color.
  - In the Marks dropdown (next to the color card), select Circle to visualize each data points as a circle.
- Adjust the size of the circles by dragging the GDP or Year to the Size card.
- You can also filter the years to focus on just 2004-2006.





if needed.

vi) Build an interactive dashboard.

Combine all the views for interactive analysis.

- Go to the Dashboard tab.
- Drag the worksheets (Map, Bar Chart, Pie Chart, Line Chart, Scatter Plot) to the dashboard canvas.
- Add filters :
  - Drag a Region, Product Category, or State field to the Filters pane.
  - Make filters interactive by enabling the "Apply to Worksheets" option.
- Use floating containers to organize the dashboard layout.
- Add titles, legends, and tooltips for better interpretation

10/11/24

11. Analysis of HR Dataset :

i) Create KPI to show employee count, attrition count, attrition rate, attrition count, active employees, and average age.

ii) Create a Lollipop Chart to show the attrition rate based on gender category.

iii) Create a pie chart to show the attrition percentage based on Department Category - Drag department into colours and change automatic to pie. Entire view, Drag attrition count to angle. Label attrition count, change to percent, add total also, edit label.

iv) Create a bar chart to display the number of employees by Age group.

v) Create a highlight table to show the Job Satisfaction Rating for each job role based on employee count.

vi) Create a horizontal bar chart to show the attrition count for each Education field Education field wise attrition - drag education field to rows, sum attrition count to column.

vii) Create multiple donut chart to show the Attrition Rate by Gender for different Age group.

i) Create KPI to show employee count, attrition count, attrition rate, attrition count, active employees and average age.

Step 1 : Load the Dataset

- Open Tableau.
- Connect to your dataset

Step 2: Create Calculated Fields

These calculated fields are used to derive metrics for the KPI dashboard:

- Employee Count:
  - Go to the Data Pane, right-click, and select Create Calculated Field.
  - Name it Employee Count and enter the formula:

    COUNTD([Employee ID])
- Attrition Count:
  - Create another calculated field named Attrition Count:

    COUNT(IF [Attrition] = 'YES' THEN [Employee ID] END)
- Attrition Rate:
  - Create a field named Attrition Rate:

  COUNT(IF[Attrition] = 'Yes' THEN [Employee ID] END) / COUNTD([Employee ID]) * 100
- Active Employees:
  - Create a field named Active Employees:

    COUNT(IF [Attrition] = 'NO' THEN [Employee ID] END)
- Average Age:
  - Create a field named Average Age:

    AVG([Age])

Step 3: Build Individual KPI Worksheets

For each KPI, create a separate worksheet:

- Employee Count KPI:
  - Open a new worksheet.
  - Drag the Employee Count calculated field to the Text shelf.

- Attrition Count KPI :
  - Create another worksheet.
  - Drag the Attrition Count Calculated field to the Text shelf.
- Attrition Rate KPI :
  - Create another worksheet.
  - Drag the Attrition Rate calculated field to the Text shelf.
  - Set the default number format to a percentage.
- Active Employees KPI :
  - Create another worksheet.
  - Drag Active Employees calculated field to the Text shelf.
- Average Age KPI :
  - Create another worksheet.
  - Drag the Average Age calculated field to the Text shelf.

Step 4: Create the KPI Dashboard

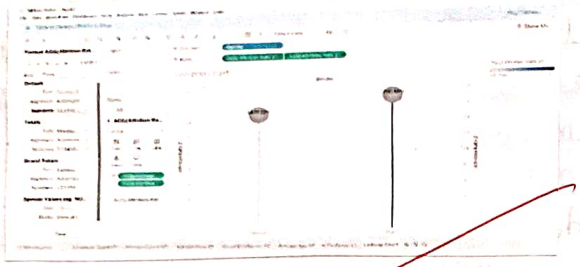
- Click the Dashboard tab at the bottom of Tableau.
- Drag and drop each KPI worksheet into the dashboard

ii) Create a lollipop chart to show the attrition rate based on gender category.

Step 1: Create the Attrition Rate calculated Field.

- Go to the Data Pane, right-click and select Create Calculated Field.
- Name the calculated field Attrition Rate.

COUNT (IF [Attrition] = 'Yes' THEN [Employee ID] END) / COUNTD([Employee ID]) * 100



- Click OK

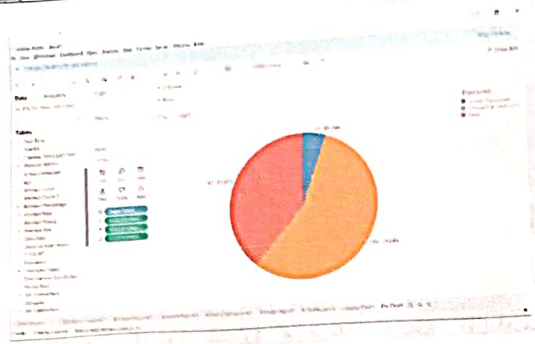
Step 2: Create the Lollipop chart
- Drag Gender to Columns
- Drag the Attrition Rate to Rows.
- Drag Attrition Rate to the Rows shelf again to create a duplicate axis.
- Right-click the second axis and choose Synchronize Axis.
- Change the mark type to Bar.
- Right-click the axis for Attrition Rate and select Format.

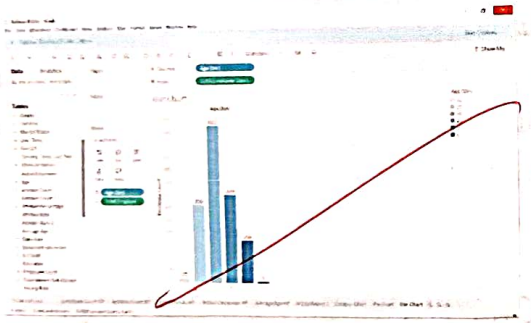
iii) Create a pie chart to show the attrition percentage based on Department Category - Drag department into colours and change automatic to pie. Entire view, Drag attrition count to angle. Label attrition count, change to percent, add total also, edit label.

Step 1: Create a Calculated Field for Attrition Count
COUNT (IF [Attrition] = 'YES' THEN [Employee ID] END)

Step 2: Create a Calculated Field for Attrition Percentage.
COUNT (IF [Attrition] = 'Yes' THEN [Employee ID] END) / COUNTD ([Employee ID]) * 100

Step 3: Create the Pie Chart
- Drag Department to Color.





- Change Mark Type to Pie.
- Drag Attrition Count to Angle.
- Set the View to Entire View.
- Drag Attrition Count to Label on the Marks Card.
- Drag Attrition Percentage to Label on the Marks Card.

iv) Create a bar chart to display the number of employees by Age group.

Step 1 : Create Age Groups

- Right - click the Age field in the Data Pane, select Create > Bins.

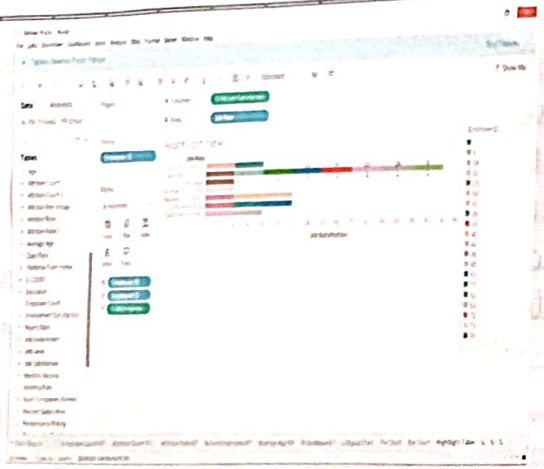
Step 2 : Build the Bar Chart

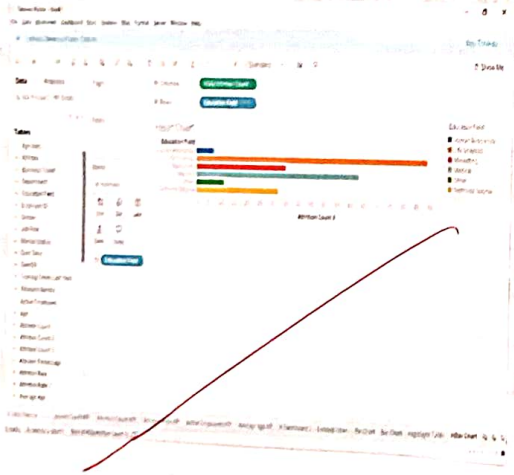
- Drag Age (bin) field to Columns.
- Drag Employee Count to Rows.
- select Bar on the Mark.
- Drag and drop Age (bin) into color and Employee Count into Label.

v) Create a highlight table to show the Job Satisfaction Rating for each job role based on employees count.

Step 1 : Build the Highlight Table

- Drag Job Role to Rows
- Drag Job Satisfaction to Columns.
- Drag Employee ID to Label / Text.





- Change the Mark Type to Square
- Drag Employee Count to Label / Text.

vi) Create a horizontal barchart to show the attrition count for each Education field wise attrition - drag education field to rows, sum attrition count to column.

Step 1: Create Calculated Field for Attrition Count
COUNT(IF [Attrition] = 'Yes' THEN [Employee ID] END)

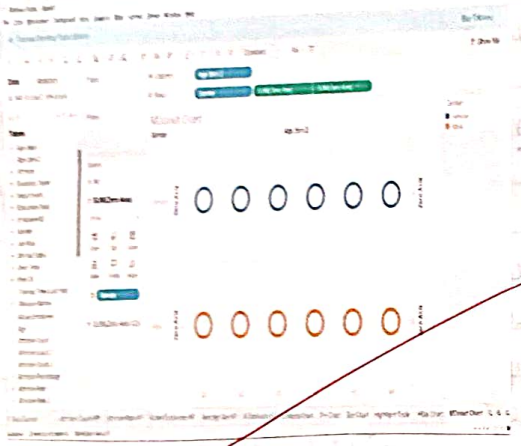
Step 2: Set Up the Horizontal Bar Chart
- Drag Education Field to Row.
- Drag Attrition Count to Column.
- Change the Mark Type to Bar
- Drag Education Field to Color.

vii) Create multiple donut chart to show the Attrition Rate by Gender for different Age group.

Step 1: Create Age Groups
- Right - click the Age field in the Data Pane, select Create > Bins.

Step 2: Create Zero Axis
0

Step 3: Build the Multiple Donut Chart
- Drag Age (bin) a field to Columns.



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- Drag Gender, Zero Axis and again Zero Axis to Rows, right click on Zero Axis > Dual Axis.
- Select Bar on the Pic.
- Drag & drop Gender into Color.

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12. Analysis of Amazon Prime Dataset :

i) Create a Donut chart to show the percentage of movie and tv shows.

ii) Create a area chart to shows by release year and type.

iii) Create a horizontal bar chart to show Top 10 genre.

iv) Create a map to display total shows by country.

v) Create a text sheet to show the description of any movie/ movies.

vi) Build an interactive Dashboard.

i) Create a Donut chart to show the percentage of movie and tv shows.

Step 1: Load the Dataset

- Open Tableau.
- Connect to your dataset.

Step 2: Create Calculated Field

- Name it as Zero Axis
  0
- Drag & Drop Zero Axis to row
- Again drag & drop zero Axie to row, right click on second zero axis and select Dual Axis.
- Create calculated field as Percentage.
  COUNT ([Type]) / TOTAL (COUNT([Type]))* 100
- Drag & Drop percentage into label > format > Numeric to percentage.

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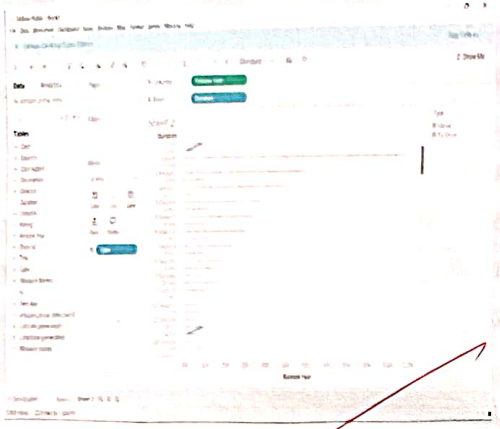

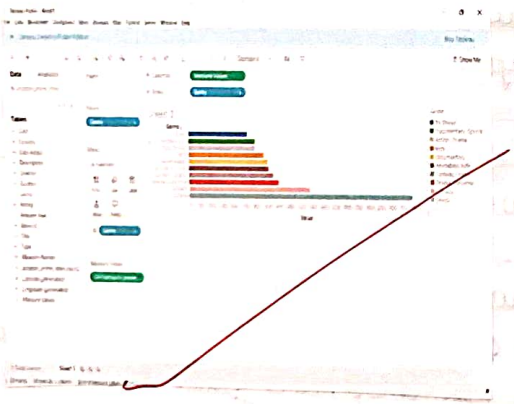

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- Drag and Drop Type to label / text and color.

ii) Create a area chart to shows by release year and type.

- Drag release_year to the Columns shelf.
- Drag type to the Color shelf in the Marks card.
- Drag Duration to the Rows shelf.
- In the Marks card, change the Marks type from Automatic to Area.

iii) Create a horizontal bar chart to show Top 10 genre.

- Drag the Genre field to the Rows shelf.
- Drag the Measure values to the Columns shelf.
- Click on the drop-down arrow in the Genre field on the Rows shelf.
- Select sort and sort by the measure in descending order, so that the highest values come first.
- Click on the Genre field on the Rows field shelf.
- Choose Filter from the dropdown and go to the Top tab.
- In the Top tab, select "By field": choose the measure, and set the top 10 items.
- Drag & drop Genre to color.

iv) Create a map to display total shows by country.

- Drag the country field to the Rows shelf. Tableau will

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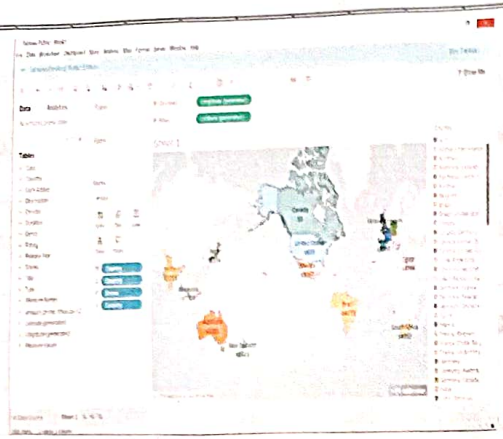

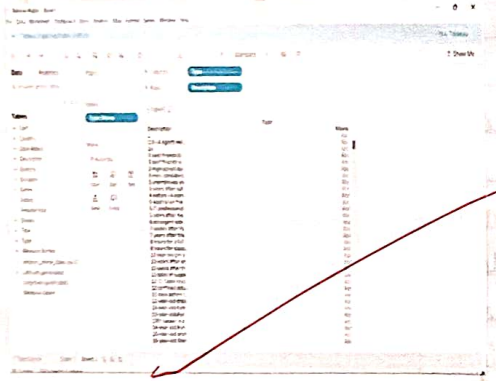

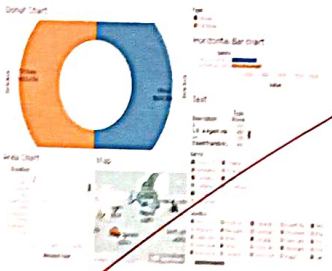

automatically generate a map view if it recognizes the field as a geographic dimension.

- Drag the Show field (or the measure for show count) to the Size shelf on the Marks card. If you're counting the shows, use a count of the Show field.
- Drag and drop country into color and label shows to label.

v) Create a text sheet to show the description of any movie / movies.

- In Tableau, go to the Sheet tab at the bottom (or click on New Worksheet).
- Drag & drop Type into filters and select movies.
- Drag & drop Type into Column and Description to row.

vi) Build an interactive Dashboard.

Combine all the views for interactive analysis.

- Go to the Dashboard tab.
- Drag the worksheets to the dashboard canvas.
- Use floating containers to organize the dashboard layout.
- Add titles, legends and tooltips for better interpret-ation.